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Bureau of Land Management

Environmental Impact Statement NV063-EIS07-019

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MOUNT HOPE PROJECT
FINAL
ENVIRONMENTAL IMPACT STATEMENT
VOLUME II of III

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BLM

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BLM/NV/BM/ES/11-25+1793

MOUNT HOPE PROJECT
FINAL ENVIRONMENTAL IMPACT STATEMENT

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APPENDICES

3.4 Geology and Mineral Resources

3.4.1 Regulatory Framework

The U.S. Congress established the right to access and develop mineral resources on open lands administered by the Federal Government under the 1872 General Mining Law. This law has been amended many times since its passage; however, the underlying right to access and develop minerals has remained in the General Mining Law. Limitations on the development of minerals under the General Mining Law have been established by the U.S. Congress in their passage of the various environmental laws (i.e., CWA, Clean Air Act [CAA], Endangered Species Act [ESA], etc.). The BLM has been charged by the U.S. Congress with the management of activities on public lands under the General Mining Law. The BLM implements this management through regulations at 43 CFR 3809.

The U.S. Congress has passed two laws that establish the policy for the development of mineral resources in the U.S. These acts are the MMPA and the Materials and Minerals Policy Research and Development Act of 1980. Congress declared that the national mineral policy is "...to foster and encourage private enterprise in (1) the development of economically sound and stable domestic mining, minerals, metal and mineral reclamation industries, (2) the orderly and economic development of domestic resources, reserves, and reclamation of metals and minerals to help assure satisfaction of industrial, security, and environmental needs ...". The 1980 Act reiterates these statements from the 1970 act.

The NDWR has safety requirements for water impoundment facilities of a size that are covered under the regulations at NAC 535.010 through 535.420. These regulations address how impoundments are designed, constructed, operated, and inspected.

Construction of mine facilities is regulated by standards of the Uniform Building Code (UBC). Eureka County currently uses the 2003 version of the International Building Code. The seismic zone designation throughout Eureka County is zone 3 on a scale ranging from 1 (indicating less damage expected) to 4 (indicating the most damage expected). Seismic activity in the vicinity of the Project Area is discussed under Section 3.4.2.4.10. Eureka County does not have specific regulations for building construction.

3.4.2 Affected Environment

3.4.2.1 Study Methods

The geology in the Project Area has been studied in detail by numerous geologic investigators. A comprehensive map of Eureka County was compiled in 1967 and is included in Geology and Mineral Resources of Eureka County, Nevada (Roberts et al.1967). The geology in the area has recently been researched and the structural setting reinterpreted (Crafford 2007) as part of the process of compiling a new geologic map for the entire State of Nevada. Crafford (2007) has described the various geologic units in context of sedimentary rocks and assemblages. Local, in depth studies of the Project Area have been ongoing since the deposit at Mount Hope was discovered. Current studies by EML geologists concur with the descriptions formulated by geologists formerly working at the Project. The following section describes the geology of the Project Area and the Mount Hope deposit. The geologic information in this section is summarized primarily from the paper written by Westra and Riedell (1996) and published in the

Geological Society of Nevada's 1996 Geology and Ore Deposits of the American Cordillera, Symposium Proceedings. Crafford's (2007) interpretations have been noted where appropriate.

3.4.2.2 Existing Conditions

The Project is located in the central Great Basin section of the Basin and Range Physiographic Province. Block faulting in the area has resulted in generally north south trending topography. Structural deformation has resulted in a series of valleys separated by mountain ranges.

3.4.2.3 Regional Geology

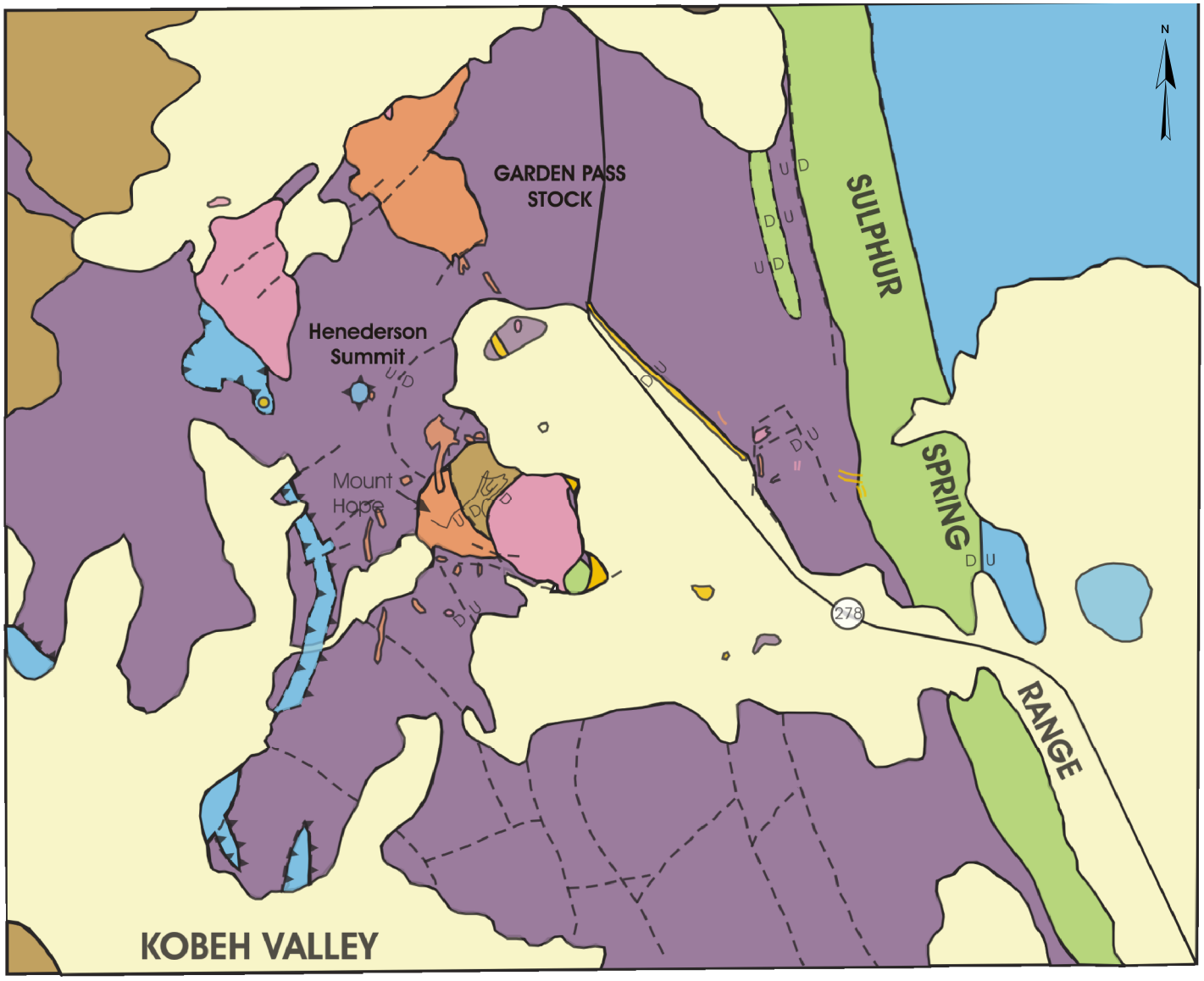
Mount Hope is situated near the leading edge of the Roberts Mountains thrust. East vergent thrusting placed a basinal sedimentary and volcanic ("Western") assemblage on top of coeval, predominantly shelf sequence carbonate rocks ("Eastern" assemblage) during the Devonian-Mississippian Antler orogeny (process of mountain building). Western assemblage mudstones, cherts, sandy limestones, sandstones, and conglomerates of the Ordovician Vinini Formation underlie most of the Project Area. Figures 3.4.1, 3.4.2, and 3.4.3 show the geology and stratigraphy of the area.

Eastern assemblage shelf sequence rocks, including the Silurian Lone Mountain Dolomite and Devonian Nevada Formation, are exposed along the eastern side of the Sulphur Spring Range. Several fault bounded exposures of dolomite and limestone of the Nevada and Devils Gate Formations lie west of Mount Hope. These have been interpreted as windows through the Roberts Mountains thrust; fault slices of lower plate material caught up in the upper plate; tectonic slides structurally interlayered with and overlying the Vinini Formation, emplaced during early Cretaceous (?)[1] gravity sliding; or lower plate blocks rotated and juxtaposed against Vinini Formation rocks by Oligocene or younger extensional faults. Previous mapping and drilling indicate that the carbonate blocks both overlie and are interleaved within the Vinini Formation, and are in turn overlain by tuffs related to the Mount Hope igneous complex. Crafford (2007) has reinterpreted and recategorized early mapped units into assemblages such as Slope Assemblage, Basin Assemblage, and others. These assemblages formed under varying circumstances and then were involved in complex structural events, which destroyed the original stratigraphic sequence making it very difficult to determine or interpret underlying and overlying strata and the age of those strata. This is a key component to the discussion of paleontology in Section 3.5.

During the Antler orogeny, an elongate foreland basin formed at the toe of the allochthon. This basin was filled with a post-orogenic coarse clastic "Overlap" assemblage representing detritus eroded off the Antler highlands. In the Mount Hope area, the Overlap assemblage is represented by Permian limestone, conglomerate, and shale of the Garden Valley Formation, exposed in the Sulphur Spring Range and at the southeastern contact of the Mount Hope igneous complex. Intermittent orogenic movement during the late Paleozoic and Mesozoic resulted in folding and thrust faulting of the Overlap assemblage and underlying formations.

The leading edge of the Roberts Mountains thrust is not exposed in the Mount Hope area; however, the distribution of Western and Eastern assemblage rocks indicates that the trace of the

[1] The use of "(?)" is a standard practices when stating uncertain geologic ages.



QUATERNARY

Alluvium

TERTIARY

Basalt flows

Dacite porphyry

Quartz porphyry

Rhyolite ash flow tuffs and vent breccias

PERMIAN

Garden Valley Formation - limestone, sandstone, conglomerate, shale

ORDOVICIAN TO DEVONIAN

Miogeosynclinal Carbonates and Clastics - Includes Eureka Quartzite, Lone Mountain and Nevada Dolomites, and Devils Gate Limestone

ORDOVICIAN

Vinini Formation - chert, siltstone, shale, limestone, quartzite

SYMBOLS

Contact

Normal fault, showing displacement

Thrust fault

SOURCE: Westra and Riedell (1996) published in the Geological Society of Nevada's 1996 Geology and Ore Deposits of the American Cordillera

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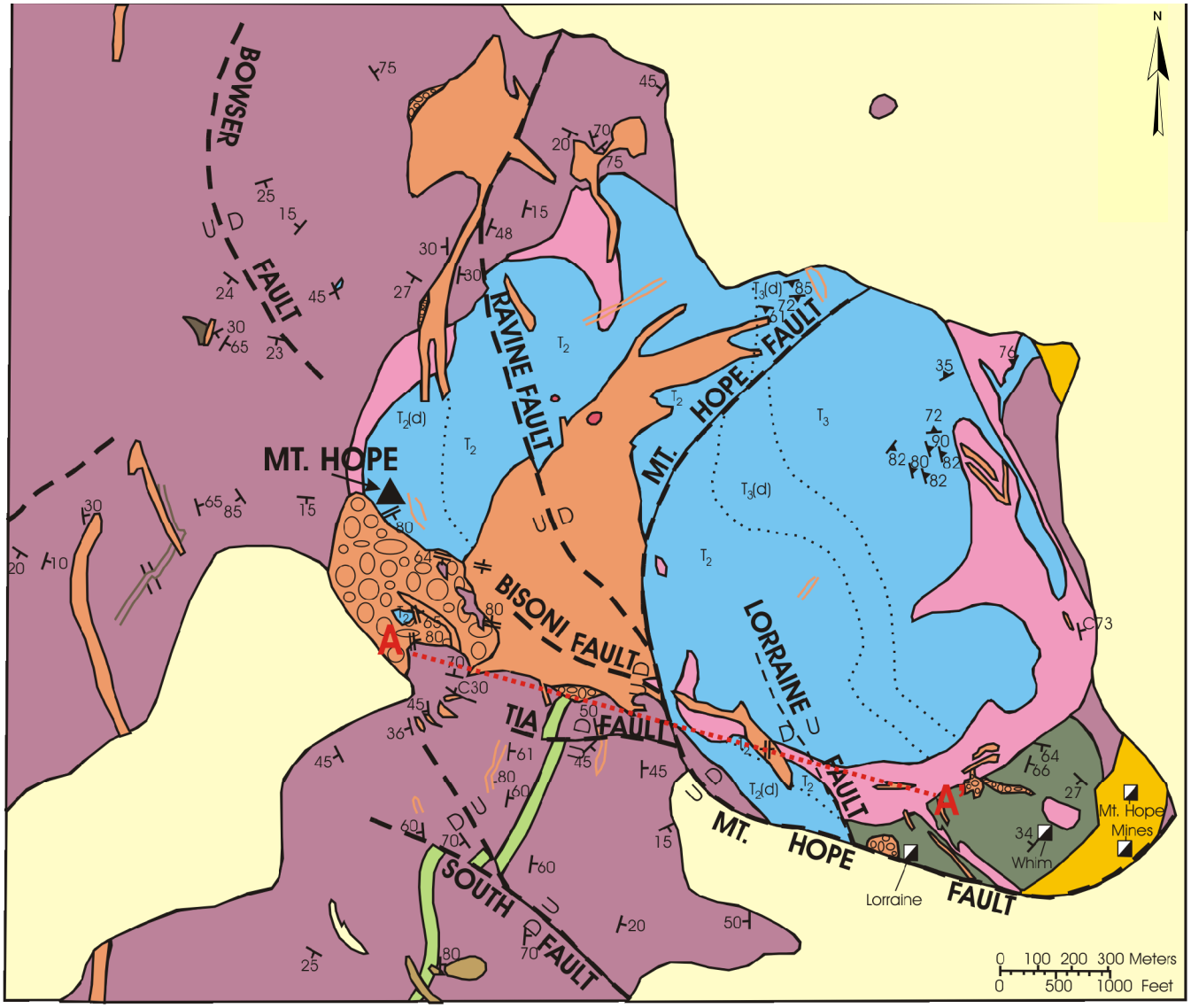
BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

General Geology of the Mount Hope Area, Nevada

Figure 3.4.1



A-A' indicates line of cross section in Figure 3.4.3.

QUATERNARY

- Alluvium

TERTIARY

- Dacite porphyry
- Quartz porphyry breccia (age uncertain)
- Quartz porphyry
- Quartz porphyry border phase
- Rhyolite vent breccia
- Quartz-eye tuff (age uncertain)
- T_3, $T_3(d)$, T_2, $T_2(d)$, T_1 — Mt. Hope Tuff - cooling units designated T_1, T_2, and T_3 from oldest to youngest; Density welded zones indicated by (d); T, undivided Mt. Hope Tuff
- Biotite quartz monzonite porphyry (age uncertain)

PERMIAN

- Garden Valley Formation

ORDOVICIAN

- Vinini Formation
- Chert, argillite, quartzite, minor limestone
- Limestone, with subordinate clastic sediments

SYMBOLS

- Contact: mapped, approximate, inferred, showing dip
- Contact between cooling and welding unit in tuff
- Normal fault, showing displacement
- Strike and dip of beds
- Strike and dip of eutaxitic foliation
- Strike and dip of sheeted quartz vein sheet
- Mine workings

SOURCE: Westra and Riedell (1996) published in the Geological Society of Nevada's 1996 Geology and Ore Deposits of the American Cordillera

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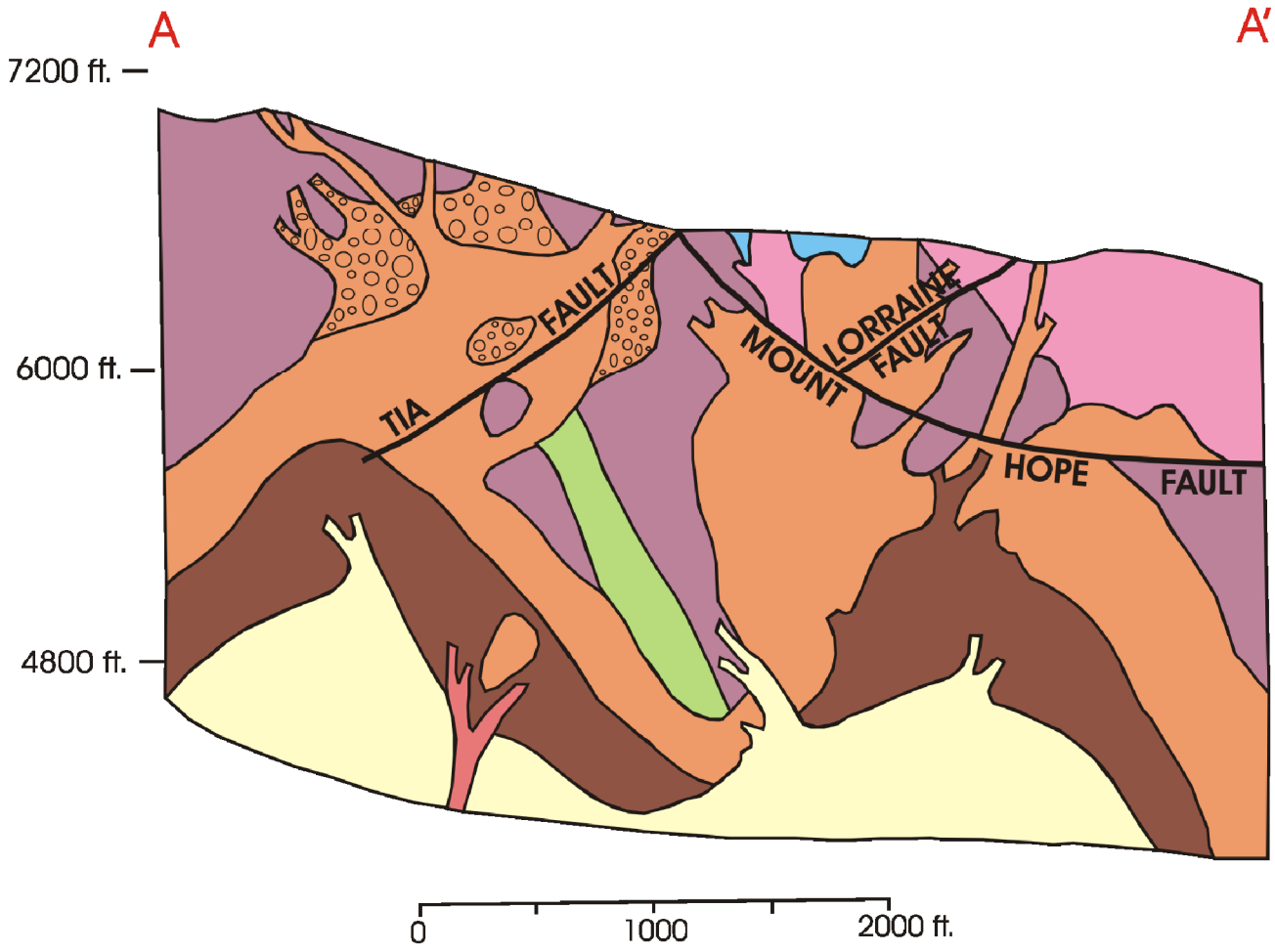
BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Geologic Map of the Mount Hope Area

Figure 3.4.2



TERTIARY

- Fine-grained granite
- Coarse-grained quartz porphyry
- Apilitic quartz porphyry
- Quartz porphyries
- Quartz porphyry border phase
- Rhyolite vent breccia
- Mount Hope Tuff

ORDOVICIAN

VININI FORMATION

- Chert, argillite, quartzite, minor limestone
- Limestone, with subordinate clastic sediments

SOURCE: Westra and Riedell (1996) published in the Geological Society of Nevada's 1996 Geology and Ore Deposits of the American Cordillera

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BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Geologic Cross Section

Figure 3.4.3

thrust is concealed beneath the Garden Valley Formation in the Sulphur Spring Range or is faulted out by the structure bounding the range to the east. Drilling in the vicinity of the Mount Hope complex, to a depth of 2,888 feet, has failed to intercept lower plate carbonate rocks.

During the Eocene and Oligocene, extensive andesitic and rhyolitic magmatism occurred within a broad east northeast trending belt that extended from central Nevada to north central Utah. Felsic magmas crystallized as small hypabyssal plugs at Mount Hope and Garden Pass and as rhyolitic ash flows at Mount Hope and in the Henderson Summit area. Unconsolidated to poorly consolidated late Tertiary and Quaternary gravel, sand, and silt fill valleys formed by Basin and Range block faulting.

3.4.2.4 Geology of the Mount Hope Area

3.4.2.4.1 Paleozoic Sedimentary Rocks

Crafford (2007) divides the rock units in the Project Area into two separate assemblages: 1) the Slope assemblage that contains Ordovician through Lower Mississippian rocks; and 2) units in the Basin assemblage that include Upper Cambrian through Devonian rocks.

The Devonian-Ordovician Vinini Formation is widely exposed south and west of the Mount Hope igneous complex. Thin to medium bedded shale, siltstone, chert, and conglomerate predominate; quartzite and sandy limestone are also present. One thin but persistent sandy limestone unit divides the section into a lower sequence of dominantly argillaceous rocks, cropping out to the west, and a chert and quartzite rich upper unit to the east. The limestone bed dips and thickens eastwardly and may correlate with skarn present in the deep subsurface.

Along the southeast side of the Mount Hope complex, the basal limestone unit of the Permian Garden Valley Formation has been preserved in a small asymmetrical syncline. It overlies Vinini Formation in an unconformable or possibly thrust contact.

3.4.2.4.2 Garden Pass Quartz Porphyry

The Garden Pass stock is located 2.5 miles north of Mount Hope and consists largely of unaltered rhyolitic quartz porphyry, similar to the main phase quartz porphyry of the Mount Hope complex.

3.4.2.4.3 The Mount Hope Igneous Complex

The Mount Hope Igneous Complex consists of rhyolitic and subordinate rhyodacitic to dacitic intrusive and extrusive phases and thus represents a subvolcanic erosion level of a mid-Tertiary eruptive center. Welded rhyolite tuffs are distinguished by the presence of shard structures and variable amounts of coarse pumice. These rocks probably formed from localized ash flows erupted from the complex. Rhyolite vent breccias are rich in lithic fragments but lack pumice and glass shards, and form steeply dipping ring dikes along the margins of the complex. Quartz porphyries occur both as autoliths in and as dikes cross cutting the rhyolite tuffs and vent breccias and must, therefore, predate and postdate the latter rock types.

Rhyolite tuffs: The most extensive ash flow unit, the informally named variably welded Mount Hope tuff, is characterized by 25 to 40 percent small angular phenocrysts, Vinini siltstone, and

pumice in a devitrified groundmass of fine crystalline quartz and K-feldspar (potassium feldspar). The texture of the tuffs contrasts with that of porphyries and pumice fragments due to the fracturing of crystals during ash flow eruption and dissipation of fine ash out of the top of the eruptive cloud, resulting in the higher phenocryst content in the tuffs.

Rhyolite vent breccias: The southeastern and northwestern contacts of the Mount Hope complex are marked by ring dikes of rhyolite vent breccia that cut all units of Mount Hope tuff. The breccias have broken crystals similar to those in the Mount Hope tuff, but contain fewer phenocrysts, larger and more abundant lithic fragments, and neither shards nor pumice. Angular fragments of early quartz porphyry and Vinini siltstone, quartzite, and hornfels are included.

Quartz porphyries: Intrusive rhyolitic quartz porphyries contain subhedral to euhedral (or rarely broken) quartz, K-feldspar, and plagioclase phenocrysts in groundmasses of allotriomorphic granular texture and varying grain size. Early quartz porphyry, presently known only from autoliths in rhyolite tuffs and vent breccias, is the only known quartz porphyry phase that predates these units. Autoliths of early quartz porphyry are most common in rhyolite vent breccia along the eastern and southeastern edges of the complex, suggesting that a mass of early quartz porphyry may occur in the subsurface in this area. No reliable macroscopic or petrographic criteria distinguish this rock type from the quartz porphyries that postdate the eruptive episode.

A minimum of four post-eruptive quartz porphyry phases together constitute an irregular intrusive mass that cuts both Mount Hope tuff and rhyolite vent breccia. From margin to core, the quartz porphyry phases become successively younger and have progressively coarser groundmasses. The discontinuous rind of the porphyry pluton, exposed primarily along the southwestern contact zone, consists of a chilled border phase. An extremely fine grained groundmass, common broken phenocrysts, and numerous xenoliths of Vinini hornfels distinguish this unit from the later porphyries. Main phase quartz porphyry, the most widespread intrusive phase at the surface, forms an irregular stock of somewhat variable texture and numerous dikes cutting the Vinini Formation.

With increasing depth, the quartz porphyry grades into or is cut by aplitic quartz porphyry characterized by distinctly coarser aplitic groundmass. Only rarely do dikes of aplitic quartz porphyry intrude overlying quartz porphyry. The core of the igneous complex consists of a heterogeneous mass of granite porphyries and coarse grained quartz porphyries. A contact breccia, with fragments of quartz porphyries and Vinini hornfels and skarn, locally separates the granite porphyry with a quartz K-feldspar oligoclase groundmass of grains. The finer grained groundmass of the coarse grained quartz porphyry in the core of the stock may be the result of pressure quenching during brecciation of the granite border zone.

Other related intrusive units are volumetrically insignificant. Fine grained granite or aplite forms rare dikes cutting all quartz porphyry phases. Small hydrothermal quartz porphyry breccias with matrices of silicified rock flour have been mapped northeast and south southeast of the summit of Mount Hope.

Intermediate rocks: Dikes of rhyodacitic to dacitic composition crop out north, east and west of the Mount Hope Complex. It is uncertain whether these rocks represent more mafic products of the Mount Hope magma chamber or different magmas altogether. Rare dikes of biotite quartz monzonite porphyry cut Vinini Formation west of the complex and are cut in turn by dikes of quartz porphyry. Dacite porphyry occurs as dikes on the lower slopes north and east of Mount

Hope and shows no crosscutting relationships with the rhyolitic units of the complex; however, this porphyry is affected by hydrothermal alteration.

Age of the Mount Hope Complex: Radiometric age dates range from 26 to 49 million years ago (Ma) and are markedly discordant for individual units. Wide spans in potassium argon and fission track dates have been reported from other porphyry Mo deposits but are now considered suspect due to probable resetting at lower temperatures. Current interpretation of these data, with consideration given to differences in the quality of samples is that the age of all the rhyolitic units is about 38 Ma based on clustering of ages in the 36 to 40 Ma range. Dacite porphyries exhibit peripheral alteration and mineralization consistent with their spatial position in the system but yield anomalously younger 30 to 33 Ma ages. Based on geologic relationships, it is inferred that the dacite porphyry is approximately the same age as the rhyolitic rocks.

3.4.2.4.4 Structural Development During the Emplacement of Mount Hope Igneous Complex

The thickness and distribution of the Mount Hope tuff in the subsurface and the highly variable and locally steep dips of eutaxitic foliation suggest that ash flow eruptions were accomplished by cauldron subsidence. The actual cauldron bounding structures have not been observed either in outcrop or drill core because they were largely to completely filled with rhyolite vent breccia. Subsidence is inferred, however, because the ring dikes of rhyolite vent breccia juxtapose outcropping Paleozoic sedimentary rocks on their outer sides against substantial thicknesses of Mount Hope tuff overlying downdropped Paleozoic rocks on their inner sides. Map patterns of rhyolite vent breccia suggest two cauldrons formed.

The western cauldron, approximately 3,300 feet in diameter, is outlined by the partial ring dike northwest and north northeast of the summit of Mount Hope. This ring fracture system juxtaposes a 1,000-foot thick section of the lower cooling unit of the Mount Hope tuff against Vinini Formation. The restricted distribution of this cooling unit indicates that eruption and accumulation were almost entirely confined to this small western cauldron.

The ring dike of rhyolite vent breccia that borders the complex on the eastern side was emplaced along a structure that juxtaposed the middle and upper cooling units against Paleozoic rocks to the east and south. The ring dike partially outlines a cauldron approximately 900 feet across, comprising the eastern half of the complex. Both middle and upper tuff units ponded in, and probably erupted from, this eastern cauldron. At least 1,150 feet of subsidence is inferred. The outflow facies of the middle cooling unit has been preserved in the Henderson Summit area and in widely scattered small erosional remnants. The Bowser fault, northwest of Mount Hope, forms a broad semi-circular structure that may define a yet larger subsidence area.

3.4.2.4.5 Postmineral Structures

Several fault zones can be traced between drill holes in the subsurface. Offsets in zones of alteration and mineralization indicate that significant postmineral normal movement took place along these structures. Locally strong pyrite and molybdenite mineralization within these zones may provide evidence for some premineral history. Two sets of faults occur: 1) high angle structures trending west northwest and 2) moderate to high angle ring shaped structures that truncate the earlier set.

The west northwest trending Bisoni and Tia faults cut the southwestern edge of the complex and adjacent Vinini Formation. The faults dip 60 to 70° in a northerly direction. The Mount Hope fault terminates these structures to the east. Offsets of Mo zones along these faults suggest postmineral movement of less than 330 feet.

The Mount Hope fault has been well defined by drilling and is a listric fault with easterly dips of 55° at the surface and 30 to 35° at depth. In plain view, the fault is spoon shaped, opening to the northeast, which suggests that displacement was in a north 65° east direction. Normal movement estimated at 650 to 800 feet placed argillic alteration on top of better grade Mo mineralization in the footwall.

The Lorraine fault appears to dip southwesterly at a moderate angle. It is restricted to the hanging wall of, and may be an antithetic normal fault related to, the Mount Hope Fault. The listric Ravine fault only occurs in the footwall of the Mount Hope fault. The Ravine fault is nearly vertical at the surface, but flattens with increasing depth to a moderate easterly dip.

Map patterns suggest that cooling units of the Mount Hope tuff dip gently northeast, although attitudes of compaction foliation are far less regular. Miocene basalts exposed in the Roberts Mountains also dip gently east suggesting that Basin and Range block faulting tilted the Mount Hope area between ten and 20° east following mineralization.

3.4.2.4.6 Alteration and Minor Element Distribution

Hydrothermal alteration and mineralization affect nearly all of the Mount Hope complex and a wide area of adjacent sedimentary rocks. Patterns of alteration and metal zoning are well developed. Mapping and petrographic study allow correlation of alteration effects in igneous rocks with those in the Vinini Formation. Regardless of host, such effects are classified into weak argillic propylitic, argillic, potassic phyllic, potassic, high silica, and biotite alteration zones, arranged from periphery to core of the hydrothermal system.

Weak Argillic Propylitic Alteration: Weak argillic and propylitic assemblages characterize the outermost zone of the Mount Hope hydrothermal system. In quartz porphyry, plagioclase is partly replaced by kaolinite and sericite. The more calcium rich dacite porphyry commonly exhibits propylitic assemblages, with aggregates of epidote, carbonates, and clays replacing plagioclase. Thermal metamorphism of Vinini argillites extends up to 2,000 feet from the contact with the Mount Hope complex and produced hornfels with blocky fracturing but no megascopic mineral changes. Local structurally controlled argillized zones, with carbonates, chlorite, and sulfides, extend outward into unaltered Vinini siltstones and shales.

Argillic Alteration: Argillic assemblages are widespread and especially well developed in Mount Hope tuff and rhyolite vent breccia in the hanging wall of the Mount Hope fault. Montmorillonite, kaolinite, mixed layer illite/montmorillonite, and minor calcite and sericite/illite completely replace plagioclase. K-feldspar is fresh to weakly “dusted” by clays and sericite. Vinini hornfels within the argillic zone contains quartz, sericite and disseminated pyrite. Closer to the center of the hydrothermal system, but still within the argillic zone, hydrothermal or contact metamorphic biotite imparts a distinctive chocolate brown color to the hornfels. Minor amounts of pyrite or pyrrhotite are present. Limestone of the Garden Valley Formation formed marble with isolated pods and lenses of skarn containing garnet, pyroxene, tremolite, epidote, fluorite, and retrograde clays, carbonates, chlorite, and biotite. Silicate veins are rare to absent in

most rock types, although sparse hairline quartz veinlets cut more competent rocks such as the densely welded tuffs. Disseminated grains and thin veinlets of pyrite increase with depth. Discontinuous veinlets containing sphalerite, pyrrhotite, or rarely galena are also common.

Low Mo (less than 20 parts per million [ppm]) and F (less than 500 ppm) values characterize the argillic zone. Highly anomalous Pb, Zn, Ag, and Mn form distinct haloes largely within the argillic zone, above and peripheral to molybdenite ore. In cross section, anomalous Pb and Ag values occur above and outside a strongly developed Zn and Mn halo. The historic Mount Hope mine exploited the high grade Zn-rich mineralization formed where this halo intersected reactive limestones of the Garden Valley Formation. Intense orbicular alteration and the highest total sulfide concentrations generally overlap with strong Zn mineralization. Cu and Sn values increase with depth in the argillic zone, but commonly peak in the underlying potassic phyllic zone.

Potassic Phyllic Alteration: Early potassic alteration with overprinted sericite forms a discontinuous zone between the potassic core and the peripheral argillic zone. This region, termed the potassic phyllic zone, is best developed in quartz porphyries and Vinini hornfels along the southern and southwestern sides of the complex. Throughout the exposed potassic phyllic zone, quartz veinlets commonly occur in near vertical sheeted sets that appear to form radial and annular patterns centered on the exposed potassic core. The potassic phyllic zone averages only one to two weight percent sulfides, mostly pyrite and molybdenite, with pyrrhotite also present in Vinini hornfels.

A rapid increase in Mo content takes place within the potassic phyllic zone. No more than 500 to 650 feet separate the 0.01 percent and the 0.1 percent Mo contours in most drill holes. Chalcopyrite bearing veinlets are also common in this zone and, where exposed to weathering, may give rise to a zone of weak chalcocite enrichment. Sn is commonly found in high concentrations. The highest F values straddle the transition between potassic phyllic and underlying potassic alteration, directly above the Mo ore zone. Fluorite occurs in veinlets and in xenomorphic aggregates replacing the porphyry groundmass and some K-feldspar phenocrysts. No topaz has yet been recognized. F is preferentially concentrated in sedimentary rocks of the Vinini Formation, and a very strong surface F anomaly occurs along the contact with the main quartz porphyry phase.

Potassic Alteration: A zone of potassic alteration represents the exposed core of the hydrothermal system and widens considerably with depth, extending easterly in the footwall of the Mount Hope fault. Potassic altered quartz porphyries consist largely of quartz, K-feldspar, and minor fluorite, and show a striking enrichment in potassium. Hydrothermal K-feldspar replaces plagioclase and floods in the groundmass. Green to yellow sericite and kaolinite, in turn, replace relict and some K-feldspathized plagioclase. Fluorite locally replaces groundmass grains and K-feldspar phenocrysts. Recrystallization of argillite formed brown hornfels containing quartz, biotite, K-feldspar, plagioclase, and minor sericite. Calcareous sedimentary rocks formed skarns containing garnet, diopside, and retrograde actinolite, hornblende, chlorite, and biotite. Some quartz veins in the calcareous rocks have envelopes of hydrothermal K-feldspar which postdate formation of the garnet skarn.

A well developed stockwork of quartz ± fluorite ± K-feldspar ± molybdenite veinlets cuts quartz porphyries and Vinini hornfels and is largely confined to the potassic zone. Vein density ranges from four to 30 volume percent of the rock. In the Vinini Formation, K-feldspar is more common

in veinlets, and haloes of dark brown biotite or pale tan grey K-feldspar surround the quartz veins. Parallel vein walls, dilation of earlier structures, and offsets of earlier by later veins all indicate that open fracture filling was the dominant mechanism of vein formation. The potassic zone averages less than one percent pyrite plus molybdenite, and outcrops contain only sparse limonites.

Potassic alteration is approximately coextensive with the surface Mo anomaly and with ore grade Mo mineralization at depth. Anomalous **W** concentrations commonly occur within the deeper part of the potassic zone. The highest **W** values occur in biotite and calc-silicate hornfels of the Vinini Formation with scheelite being the dominant W mineral.

High Silica Alteration: A gradual increase in barren granular hydrothermal silica with depth marks the transition into zones of high silica alteration. In igneous rocks, high silica zones contain in excess of 30 volume percent hydrothermal quartz in veins and irregular replacements. Locally, massive silica has obliterated all igneous textures. In addition to quartz, these high silica zones contain minor carbonates, chlorite, and pyrite, but fluorite is conspicuously absent. Quartz produced by silica flooding is coarser grained than quartz occurring in stockwork veins. Petrographic study suggests that silica flooding began with suturing of strained quartz phenocrysts, forming mosaics that grew outward and coalesced into patches of granular silica. In Vinini hornfels, vein quartz increases only slightly in the high silica zone, but veinlets are less regular and nebulous patches of silica flooding are more common than in the overlying potassic zone.

Patches of silica flooding consistently appear to cut quartz molybdenite ± fluorite veinlets in drill core, in some instances assimilating remnants of mineralized fractures as "ghost" molybdenite. Such relationships suggest that silicic alteration formed somewhat later than the bulk of molybdenite mineralization.

A slight increase in pyrite content accompanies the transition from potassic to high silica alteration. Magnetite, absent from higher levels of the system, averages up to 0.5 weight percent in veinlets with quartz, biotite, chlorite, and pyrite. Traces of arsenopyrite and hematite have been noted, and Pb and Zn are locally anomalous. A significant increase in sericite, kaolinite, and calcite after relict feldspars occurs 160 to 330 feet below the top of the high silica zone and overlaps into the underlying biotite zone.

Biotite Alteration: A zone characterized by magmatic and hydrothermal biotite occurs in the subsurface in granite porphyry and coarse grained quartz porphyry. Aggregates of hydrothermal biotite with retrograde chlorite and sericite occupy magmatic biotite sites. Primary biotite and oligoclase become more abundant with increasing depth. Widely spaced high angle quartz calcite veins are common. A thin zone of low-grade Mo and W mineralization generally occurs near the top of the biotite zone.

3.4.2.4.7 Nature and Habit of Molybdenite Mineralization

Molybdenite mineralization at Mount Hope occurs in a stockwork of fractures and veinlets. Disseminated molybdenite, although present, is very rare. The bulk of mineralization occurs in four types of veinlets: 1) quartz molybdenite veinlets (comprising 75 percent of ore) range from 0.1 to five millimeters (mm) in thickness and generally contain molybdenite crystals averaging one mm in the longest dimension; 2) coarse quartz molybdenite veins (ten percent of ore) are

five to 20 mm thick and are lined with rich clusters of molybdenite crystals averaging 0.08 mm across. Such veins are most common in Vinini Formation; 3) blue quartz veins (ten percent of ore) are three to ten mm thick and bluish gray in color, imparted by sparse grains of molybdenite averaging 0.05 mm across. These veins are most common in the deeper part of the system; and 4) molybdenite "paint" (five percent of ore) refers to thin films of molybdenite, commonly smeared and slickensided, on fractures devoid of quartz.

3.4.2.4.8 Vein Paragenesis

The age relations between various vein types at Mount Hope are complex. Detailed core logging and petrographic studies suggest the following generalized sequence: 1) early barren quartz ± K-feldspar ± fluorite veins; 2) quartz fluorite molybdenite ± K-feldspar veins; 3) quartz molybdenite ± fluorite veins; 4) blue quartz veins; 5) granular silica associated with the formation of high silica zones; 6) quartz sericite pyrite ± chlorite ± fluorite veinlets (shallow); quartz pyrite ± magnetite ± biotite ± chlorite veinlets (deep); 7) molybdenite "paint" on fractures; and 8) late fractures lined with pyrite, clay or carbonate. Pervasive early potassic alteration affected all quartz porphyries, hornfels of the Vinini Formation, and possibly Mount Hope tuff. Related vein types 1 and 2 cut potassic altered porphyries and Vinini Formation but are rare in the tuffs. Molybdenite bearing quartz veins, types 2 through 4, formed during the transition from potassic to high silica alteration. These veins appear to become thicker and leaner in molybdenite with time and increasing depth, and culminate in the patches of barren granular quartz comprising the high silica assemblage. Weakly developed phyllic alteration, represented by vein type 6, cut potassic and high silica alteration. Argillic alteration may by superimposed on potassic altered Mount Hope tuff and extends well beyond the earlier potassic zone.

3.4.2.4.9 Local Geologic Structures

Three Quaternary age faults have been mapped within ten miles of the Project Area. There is a discontinuous and vaguely defined group of faults that extend southeast from approximately four miles west of Mount Hope to three miles northwest of Mount Whistler, on the southeastern flank of the Roberts Mountains. These are short faults where bedrock is found against Quaternary pediment slope deposits (Lidke 2000). There is evidence along the zone for at least one faulting event that is no older than early Pleistocene in age.

Another group of faults strikes north and is located in the Garden Valley area immediately north of the Project Area. These faults trend north and appear to down drop Quaternary deposits of the Garden Valley against Paleozoic and Tertiary bedrock of the Roberts Mountains and Sulphur Springs Range, which border the western and eastern flank of the valley, respectively (Lidke 2000). There is evidence for Quaternary movement along these faults, but no estimates of offset amounts for these faults have been reported.

Approximately ten miles southwest of Mount Hope is a northwest striking fault that follows the southwestern flank of the Roberts Mountains. It is a major range front fault that appears to extend farther southeast as a prominent scarp on pediment slope deposits of the northern part of the Kobeh Valley (Lidke 2000). Along the southwestern flank of the Roberts Mountains, the fault has a down to the southwest stratigraphic offset that juxtaposes Paleozoic bedrock against Quaternary pediment slope deposits (Lidke 2000). Evidence of latest movement is Holocene in age.

None of these faults have been studied in detail and very little is known about their nature, character and movement history, and there is no record of recent movement along these faults.

3.4.2.4.10 Seismicity

Although the Project is in a seismically active region of the country, it is not located within Nevada's major seismic belts. A search of the UNR Seismological Laboratory database revealed that from 1872 to 2008, there have been 364 recorded earthquakes greater than 3.0 within 100 miles of the site; 40 recorded earthquakes greater than 3.0 within 50 miles of the site, and zero recorded earthquakes greater than 3.0 within ten miles of the Project Area. Most of the earthquake activity in the last 156 years has been 100 miles west of the Project Area.

Table 3.4-1 indicates that 89 percent of the earthquakes within 100 miles of the site and 98 percent of the earthquakes within 50 miles of the site have been below 5.0 in magnitude. The highest magnitude earthquakes were 7.2 and 7.8 and were located approximately 100 miles southwest and 90 miles northwest, respectively. The highest magnitude earthquake (5.5) closest to the Project Area, was recorded on April 2, 1875, approximately 26 miles to the southeast. There have been no earthquakes recorded with a magnitude greater than 3.5 within ten miles of the proposed site since record keeping began in 1852.

Table 3.4-1: Seismic Events (>3.0) Recorded Near the Project Area Between 1872 and 2008

Local Magnitude	Number within 100 Miles	Number within 50 Miles	Number within 10 miles
>7.0	2	0	0
6.0 - 6.9	3	0	0
5.0 - 5.9	36	1	0
4.0 - 4.9	207	19	0
3.0 - 3.9	116	20	0

Assessment of the seismic hazards at Mount Hope was conducted using seismic models available from the USGS. One assessment tool models the occurrence of a seismic event within a 30 mile radius of the site within the next 50 years. Another calculates the peak acceleration caused by a seismic event in the next 50 years.

The USGS model indicated that the probability of a magnitude 5.0 quake occurring within 30 miles of the site in the next 50 years is between 0.4 and 0.5. The probability of a magnitude 6.0 quake occurring within 30 miles of the site in the next 50 years is between 0.10 and 0.15. The probability of an earthquake greater than a 7.0 occurring within 30 miles of the site in the next 50 years is between 0.005 and 0.01. The probability of an earthquake greater than 8.0 occurring within 30 miles of the area in the next 50 years is essentially zero.

In order to evaluate the force on a building during an earthquake, peak acceleration can be calculated for an area. During an earthquake ground acceleration varies with time. Peak acceleration can be calculated with a two percent and ten percent probability of exceedance in 50 years. An exceedance of two percent was used because it is the most conservative amount. The analysis was completed so that there is a two percent chance that the ground acceleration would be exceeded in a 50 year time period. For the Project, the percentage is calculated between 20 and 30 percent. A percentage of 20 to 30 percent calculated for the Project Area indicates that

if there is an earthquake within the next 50 years, then it would result in negligible damage to buildings of good design and construction.

3.4.2.4.11 Mineral Resources

The Mount Hope deposit is a classic Mo porphyry, similar in type to the Climax deposit in Colorado. This type of deposit has well zoned molybdenite mineralization where many intersecting small veins of molybdenite form a stockwork in an altered quartz monzonite porphyry. Similar to other porphyry-type ore deposits, the ore is low-grade but the ore body is very large. EML is focused on the economic Mo mineralization in the deposit; however, based on drilling results and the presence of other mineralization in the district such as W, Ag, gold (Au), Pb, Zn, and Cu that are present in the pit walls adjacent to and distal from the open pit, EML would evaluate these additional mineral resources in the future (**Independent Mining Consultants [**IMC**]** 2005). The Mount Hope deposit contains a nearly 1.0 billion ton molybdenite ore body that would produce approximately 1.1 billion pounds of recoverable Mo during its 44-year lifetime. **Approximately** 2.7 billion tons of ore and waste rock would be excavated from the open pit with an ore to waste ratio of 1:1.6. A single open pit would result from the phased mining. The ultimate pit depth would be approximately 2,600 feet **bgs** at an elevation of approximately 4,700 feet amsl.

Exxon in 1988, in one of their last diamond drill holes, encountered significant widths of good grade Zn mineralization. The drill hole encountered two zones: one zone from 128 to 272 feet in depth, 144 feet assayed 9.1 percent Zn; and one zone from 423 to 472 feed in depth, 49 feet assayed 9.3 percent Zn. Recent analyses determined that the mineralization represents a skarn zone between sediments and quartz porphyry. The mineralization in this hole is approximately 300 feet north and generally along trend of the Zn mineralization in the original Mount Hope underground Zn mine. As long as a mile of strike length remains open and unexplored. The zone is outside the limits of the planned Mo open pit. The original underground workings developed a high-grade Zn zone; however, there was no follow up to determine the full extent of the deposit after the Mo deposit was discovered in 1978.

3.4.3 Environmental Consequences and Mitigation Measures

Major issues related to geology and minerals include the following: a) geologic hazards created or magnified by Project development; b) failure of, or damage to, critical facilities caused by seismically induced ground shaking; and c) exclusion of future mineral resource availability caused by the placement of facilities (tailings or waste rock storage areas, etc.).

3.4.3.1 Significance Criteria

Adverse impacts to geology and minerals would be significant if the proposed action or alternatives resulted in any of the following:

- Impacts to the facility site or design caused by geologic hazards, including landslides and catastrophic slope failures or ground subsidence;
- Structural damage or failure of a facility caused by seismic loading from earthquakes; or
- Restriction on the current or future extraction of known mineral resources.

3.4.3.2 Assessment Methodology

Impacts of the Proposed Action and Project Alternatives were assessed based on review of reports prepared in support of the Project, review of the Project baseline characterization reports (SRK 2006), review of the Plan for the Project (EML 2006), and review of the Proposed Action. The significance of the impacts was evaluated based on the significance criteria listed above. Stability analysis of the Project waste rock dumps was analyzed in the Waste Rock Disposal and Low Grade Ore Storage Facilities Design Report (SWC 2008a). Stability analyses for the Project storage and tailings facilities are included in the South and North Tailings Storage Facilities Located in Kobeh Valley Design Report (SWC 2008b).

Waste Rock Disposal Facilities

Slope stability analyses for the WRDFs were conducted in support of the permitting level design. These analyses required the selection of strength parameters from the geotechnical work performed to date and from experience on projects similar to the Project. The slope stability analyses examined the stability of the proposed WRDFs and the LGO Stockpile under both static and seismic loading conditions.

Slope stability analyses were completed for five cross sections developed from ultimate facility configurations under the Proposed Action. Detailed information can be found in SWC's reports (2008a and 2008b), which can be viewed during normal office hours at the MLFO. For this study, all stability analyses were conducted using SLIDE V5.0 (RocScience 2007), which analyzes the stability of slopes using the limit equilibrium method. The limit equilibrium method of analysis used to find the critical circular and wedge type failure surfaces was the Spencer Method. The Spencer Method satisfies both moment and force equilibrium. The program automatically iterates through a variety of potential failure surfaces, calculates the safety factor for static and pseudostatic conditions for each surface according to Spencer's Method, and selects the surface with the minimum factor of safety commonly referred to as the critical failure surface. Specific input requirements of the SLIDE program include geometric profiles, material properties (moist unit weight, saturated unit weight, effective cohesion, and effective friction angle) and a phreatic surface profile.

Stability analyses were conducted under both static and seismic loading conditions. An earthquake event having a 1,100-year return period with a four percent probability of exceedance occurring during the 45-year operation life is considered appropriate for design of the waste rock facilities at Mount Hope. Peak horizontal ground accelerations (PHGA) were determined to be 0.15 gravity (g) and 0.23g for firm rock (Sb) and soil (Sc) respectively. For slope stability analyses, a design horizontal ground acceleration equal to two thirds of the PHGA is considered conservative for deep rotational failures (Hynes and Franklin 1984); therefore, a value of 0.15g was conservatively selected for analyzing WRDFs and the LGO Stockpile both on firm rock and soil. The complete hazard analysis is described in detail in SWC (2008b).

Strength parameters were established based on laboratory testing to date and SWC's experience with similar projects. The waste rock materials contained within all three facilities were considered to be predominantly comprised of competent, relatively durable rock based on comparatively shallow overburden depths of soil overlying bedrock within the ultimate pit limit. Results of the slope stability analyses performed on the waste rock facilities and LGO Stockpile are presented in Table 3.4-2.

Stability analyses were completed for the South TSF at the ultimate crest elevation of 6,710 feet and at the mid-life crest elevation of 6,525 feet under both static and seismic loading conditions. Since the TSF is sited in a somewhat remote area, the tailings embankment was classified as a "large dam significant hazard" in accordance with Nevada Dam Safety Guidelines. Under this classification, a dam is considered a significant hazard if its failure carries a low potential for loss of life but could cause an appreciable economic loss.

Table 3.4-2: Summary of Stability Analyses Results for the Waste Rock Disposal Facilities and the Low-Grade Ore Stockpile

Location	Section	Static Factor of Safety (Circular/Wedge)	Pseudostatic Factor of Safety (Circular/Wedge)
Non-PAG WRDF	1	2.0/2.0	1.3/1.3
	2	2.0/2.0	1.3/1.3
PAG WRDF	3	2.0/2.0	1.3/1.4
	4	2.0/2.1	1.4/1.4
Low-Grade Ore Stockpile	5	1.7/1.7	1.2/1.2

Tailings Storage Facilities

Similar to the WRDF analyses, the TSFs were analyzed using SLIDE V5.0 (RocScience 2007) using the Spencer Method. Static analyses were conducted with no applied horizontal forces, while pseudostatic analyses modeled design seismic conditions by incorporating a constant horizontal force. The embankment section selected for analysis is composed of foundation soil, cycloned sand, slimes, rockfill (toe drain), starter dam material, and smooth and textured LLDPE geomembrane liner. The material properties used for the slope stability analysis were established based on the geotechnical investigation and laboratory testing performed to date, from work completed on other projects similar in nature, area specific experience, and published data from previous studies. The nonlinear shear strength envelope was determined from Shear Interface Testing (SWC 2008b).

The distribution of head and predicted phreatic level within the facility were modeled using a finite element method seepage model embedded within the SLIDE V5.0 program. The facility cross section was modeled under steady state conditions with the probable maximum flood pond level. The phreatic surface model is considered a worst case scenario where the underdrain system is not functional, and the operating pool is at the permitted maximum freeboard level. The modeled phreatic surface is considered to be conservative because it is anticipated that the underdrain system would function as designed and the cycloned sand embankment would remain unsaturated. In addition, the supernatant reclaim pond would be maintained a considerable distance from the crest of the TSF; however, at a minimum, the reclaim pond should be maintained 1,500 feet from the TSF crest during extreme flood conditions. The TSF cross section was modeled as having a uniform conductivity in all directions (isotropic) for all material types. The hydraulic conductivities for the materials overlying the geomembrane liner were selected from laboratory data and experience with similar material on other projects. Hydraulic conductivities used in the finite element model are summarized in SWC (2008b). Results of the stability analyses for the cross sections under consideration are shown in Table 3.4-3.

Table 3.4-3: Results of Slope Stability Analyses for the Tailings Storage Facilities

Section	Type of Failure Modeled	Static Factor of Safety
Ultimate TSF	Circular	2.2
	Block	1.5
18-year (mid-life) TSF	Circular	2.0
	Block	1.5

3.4.3.3 Proposed Action

3.4.3.3.1 Mineral Resources

Direct impacts of the Proposed Action on geologic and mineral resources would result in excavation of **approximately** 2.7 billion tons of ore and waste rock from the open pit with an ore to waste ratio of 1:1.6. This equates to 1.0 billion tons of ore that would be processed. A total of 1.1 billion pounds of Mo would be shipped off site and the remainder of the material would be sent to the two tailings facilities. A total of 1.7 billion tons of waste rock would be stored in WRDFs immediately adjacent to the open pit.

The placement of the WRDFs immediately adjacent to the open pit could limit the future development of mineral resources located in the pit walls adjacent to the open pit, should those potential mineral resources be amenable to development through open pit mining methods; however, there is not sufficient reasonably available geologic and resource information to more definitively address this potential impact.

- **Impact 3.4.3.3-1:** Implementation of the Proposed Action would result in resource extraction and production of 1.1 billion pounds of Mo.

  Significance of the Impact: This is not considered a potentially significant impact to geology and minerals. However, the impact is economically significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.4.3.3-2:** Implementation of the Proposed Action would result in the extraction of waste rock that would be placed adjacent to the open pit and limit the future development of the identified Zn mineralization located to the north of the open pit.

  Significance of the Impact: This is not considered a potentially significant impact to geology and minerals, because a known Zn mineralization has not been sufficiently defined and potentially could be developed using underground mining techniques.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.4.3.3.2 Geological Hazards

The USGS model indicated that the probability of a magnitude 5.0 quake occurring within 30 miles of the site in the next 50 years is between 0.4 and 0.5. The probability of a magnitude

6.0 quake occurring within 30 miles of the site in the next 50 years is between 0.10 and 0.15. The probability of an earthquake greater than a 7.0 occurring within 30 miles of the site in the next 50 years is between 0.005 and 0.01. The probability of an earthquake greater than 8.0 occurring within 30 miles of the area in the next 50 years is essentially zero.

Seismic events could result in slope failures or structural damage to mine facilities due to an earthquake event having a 1,100-year return period with a four percent probability of exceedance during the operational life of the Project. Based on the results from SWC's analyses (2008a), which indicate a safety factor of 1.7 to 2.0, the WRDFs and Low-Grade Ore Stockpile are stable for all conditions analyzed.

For a water impoundment facility, which is the standard to which the embankment is designed, the desired minimum static factor of safety required by the NDWR is typically 1.4 for static conditions. Based on the results from SWC's analyses of the TSFs (2008b), the proposed facility is stable under static loading conditions since the computed values (1.5 to 2.2) exceed the prescriptive factors of safety; therefore, there would be no impacts associated with geologic hazards.

3.4.3.3.3 Residual Impacts

The potential residual impacts to geology and mineral resources from the Proposed Action are an irreversible and irretrievable commitment of mineral resources through the removal of 1.1 billion pounds of Mo from the mined materials.

3.4.3.4 No Action Alternative

3.4.3.4.1 Mineral Resources

As a result of the No Action Alternative, none of the impacts to the mineral resources generated by the Proposed Action or any other alternative would occur; therefore, implementation of the No Action Alternative would restrict the development of a known mineral resource and not allow the removal of 1.1 billion pounds of Mo from the materials that would have been mined.

- **Impact 3.4.3.4-1:** A known mineral resource with 1.1 billion pounds of recoverable Mo would not be developed due to implementation of the No Action Alternative.

  Significance of the Impact: This impact is considered significant; however, no mitigation measures appear feasible.

3.4.3.4.2 Geological Hazards

The No Action Alternative would result in no impacts from geologic hazards associated with the Proposed Action. Impacts associated with normal earth dynamics (i.e., earthquakes) could occur but could not be predicted.

3.4.3.4.3 Residual Impacts

Under the No Action Alternative, residual adverse impacts to mineral resources would not occur because the known mineral resource would not be developed; however, this impact is not irreversible or irretrievable.

3.4.3.5 Partial Backfill Alternative

3.4.3.5.1 Mineral Resources

Implementation of the Partial Backfill Alternative would result in potential impacts that are similar to those outlined under the Proposed Action.

Direct impacts of the Partial Backfill Alternative on geologic and mineral resources would result in excavation of **approximately** 2.7 billion tons of ore and waste rock from the open pit with an ore to waste ratio of 1:1.6. This equates to 1.0 billion tons of ore that would be processed. A total of 1.1 billion pounds of Mo would be shipped off site, and the remainder of the material would be sent to the two tailings facilities. A total of 1.7 billion tons of waste rock would be stored in WRDFs immediately adjacent to the open pit, and then there would be the placement of 1.24 billion tons of this mined waste rock back into the open pit.

The placement of a majority of the waste rock back into the open pit, as well as the placement of the remaining WRDF immediately adjacent to the open pit could limit the future development of mineral resources located in the pit walls adjacent to the open pit should those mineral resources be amenable to development through open pit mining methods. This alternative would have impacts similar to the impacts of the Proposed Action. In addition, the placement of the waste rock back into the open pit would limit the future development of a mineral resource (see Section 3.4.2.4.11) that would be amenable to development through underground mining methods; however, there is not sufficient reasonably available geologic and resource information to more definitively address this potential impact.

- **Impact 3.4.3.5-1:** Implementation of the Partial Backfill Alternative would result in resource extraction and production of 1.1 billion pounds of Mo.

  Significance of the Impact: This is not considered a potentially significant impact to geology and minerals. However, the impact is economically significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.4.3.5-2:** Implementation of the Partial Backfill Alternative would result in the extraction of waste rock that would be placed adjacent to the open pit and then replaced within the open pit, thus limiting the future development of the identified Zn mineralization located to the north of the open pit to a degree that is greater than under the Proposed Action.

  Significance of the Impact: This is not considered a potentially significant impact to geology and minerals, because a known Zn mineralization has not been sufficiently defined and potentially could be developed using underground mining techniques.

No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.4.3.5.2 Geological Hazards

The potential geological hazards impacts from the Partial Backfill Alternative would be the same as those discussed under the Proposed Action.

3.4.3.5.3 Residual Impacts

The potential residual impacts to geology and mineral resources from the Partial Backfill Alternative are an irreversible and irretrievable commitment of mineral resources through the removal of 1.1 billion pounds of Mo from the mined materials.

3.4.3.6 Off-Site Transfer of Ore Concentrate for Processing Alternative

3.4.3.6.1 Mineral Resources

The potential impacts to geology and mineral resources from the Off-Site Transfer of Ore Concentrate for Processing Alternative are an irreversible and irretrievable commitment of mineral resources through the removal of 1.1 billion pounds of Mo from the mined materials.

- **Impact 3.4.3.6-1:** Implementation of the Proposed Action would result in resource extraction and production of 1.1 billion pounds of Mo.

  Significance of the Impact: This is not considered a potentially significant impact to geology and minerals. However, the impact is economically significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.4.3.6-2:** Implementation of the Proposed Action would result in the extraction of waste rock that would be placed adjacent to the open pit and limit the future development of the identified Zn mineralization located to the north of the open pit.

  Significance of the Impact: This is not considered a potentially significant impact to geology and minerals, because a known Zn mineralization has not been sufficiently defined and potentially could be developed using underground mining techniques.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.4.3.6.2 Geological Hazards

The potential geological hazards impacts from the Off-Site Transfer of Ore Concentrate for Processing Alternative would be the same as those discussed under the Proposed Action.

3.4.3.6.3 Residual Impacts

The potential residual impacts to geology and mineral resources from the Off-Site Transfer of Ore Concentrate for Processing Alternative are an irreversible and irretrievable commitment of mineral resources through the removal of 1.1 billion pounds of Mo for the mined materials.

3.4.3.7 Slower, Longer Project Alternative

3.4.3.7.1 Mineral Resources

Impacts to mineral resources from the Slower, Longer Project Alternative are expected to be similar to impacts from the Proposed Action; however, impacts from the Slower, Longer Project Alternative would occur over a period approximately twice as long in duration compared to the Proposed Action.

- **Impact 3.4.3.7-1:** Implementation of the Slower, Longer Project Alternative would result in resource extraction and production of 1.1 billion pounds of Mo.

  Significance of the Impact: This is not considered a potentially significant impact to geology and minerals. However, the impact is economically significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.4.3.7-2:** Implementation of the Slower, Longer Project Alternative would result in the extraction of waste rock that would be placed adjacent to the open pit and limit the future development of the identified Zn mineralization located to the north of the open pit.

  Significance of the Impact: This is not considered a potentially significant impact to geology and minerals, because a known Zn mineralization has not been sufficiently defined and potentially could be developed using underground mining techniques.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.4.3.7.2 Geological Hazards

The potential geological hazards impacts from the Slower, Longer Project Alternative would be the same as those discussed under the Proposed Action.

3.4.3.7.3 Residual Impacts

The potential residual impacts to geology and mineral resources from the Slower, Longer Project Alternative are an irreversible and irretrievable commitment of mineral resources through the removal of 1.1 billion pounds of Mo for the mined materials.

3.5 Paleontology

3.5.1 Regulatory Framework

On March 30, 2009, Paleontological Resource Protection Act (PRPA) became law when President Barack Obama signed the Omnibus Public Land Management Act (OPLMA) of 2009, Public Law 111-011. Public Law 111-011, Title VI, Subtitle D on Paleontological Resources Preservation **(PRP)** (123 Stat. 1172; 16 U.S.C. 470aaa) requires the Secretaries of the Interior and Agriculture to manage and protect paleontological resources on federal land using scientific principles and expertise. The OPLMA-PRP includes specific provisions addressing management of these resources by the BLM, NPS, Bureau of Reclamation, U.S. Fish and Wildlife Service (USFWS), and U.S. Forest Service (USFS).

The BLM manages paleontological resources under a number of federal laws including: FLPMA Sections 310 and 302(b), which directs the BLM to manage public lands to protect the quality of scientific and other values; 43 CFR 8365.1-5, which prohibits the willful disturbance, removal, and destruction of scientific resources or natural objects; 43 CFR 3622, which regulates the amount of petrified wood that can be collected for personal noncommercial purposes without a permit; and 43 CFR 3809.420 (b)(8), which stipulates that a mining operator "shall not knowingly disturb, alter, injure, or destroy any scientifically important paleontological remains or any historical or archaeological site, structure, building or object on Federal lands."

IM No. 2008-009, effective October 15, 2007, defines the BLM classification system for paleontological resources on public lands. The classification system is based on the potential for the occurrence of significant paleontological resources in a geologic unit and the associated risk for impacts to the resource based on federal management actions. This classification system for paleontological resources is intended to provide a more uniform tool to assess potential occurrences of paleontological resources and evaluate possible impacts. The system uses geologic units as base data, which are more readily available to all users, and is intended to be applied in broad approach for planning efforts, and as an intermediate step in evaluating specific projects.

The descriptions for the classes used in the Potential Fossil Yield Classification (PFYC) system are intended to serve as guidelines rather than strict definitions. Knowledge of the geology and the paleontological potential for individual units or preservational conditions should be considered when determining the appropriate class assignment.

In addition, IM No. 2009-011, effective October 10, 2008, provides guidelines for assessing potential impacts to paleontological resources in order to determine mitigation steps for federal actions on public lands under the FLPMA and the NEPA. These guidelines also apply where a federal action impacts split estate lands. This IM provides for field survey and monitoring procedures to help minimize impacts to paleontological resources from federal actions in cases where it is determined that significant paleontological resources would be adversely affected by a federal action.

These two IMs, along with the PFYC system, provide guidance for the assessment of potential impacts to paleontological resources, field survey and monitoring procedures, and recommended mitigation measures that protect paleontological resources impacted by federal actions.

It is the policy of the BLM that potential impacts from federal actions on public lands, including land tenure adjustments, be identified and assessed, and proper mitigation actions be implemented when necessary to protect scientifically significant paleontological resources. This policy also applies to federal actions impacting split estate lands and is subject to the right of landowners to preclude evaluation and mitigation of paleontological resources on their land. The removal of a significant paleontological resource from public lands requires a Paleontological Resources Use permit for collection. Significant paleontological resources collected from public lands are federal property and must be deposited in an approved repository. Paleontological resources collected from split estate lands are the property of the surface estate owner, and their disposition would be in accordance with the surface agreement between the landowner and the permittee.

Surface disturbing activities may cause direct adverse impacts to paleontological resources through the damage or destruction of fossils or loss of valuable scientific information by the disturbance of the stratigraphic context in which fossils are found. Indirect adverse impacts may be created by increased accessibility to important paleontological resources, leading to looting or vandalism. Land tenure adjustments may result in the loss of significant paleontological resources to the public if paleontological resources pass from public ownership. Generally, the Project proponent is responsible for the cost of implementing mitigation measures, including the costs of investigation, salvage, and curation of paleontological resources.

3.5.2 Affected Environment

3.5.2.1 Study Methods

The Assessment of Potential Impacts to Paleontological Resources (IM No. 2008-009) was reviewed using the PFYC system, based on current geologic mapping, to determine if impacts to paleontological resources would occur. Based on scoping of the Proposed Action in regard to paleontological resources, if initial scoping identifies the possibility for adversely affecting paleontological resources, further analysis is necessary. Guidance indicates that if there would be no impact or potential impact based on the action, or the fossil resource may be impacted but is too deep to be recovered (e.g., deep well bore passing through a fossil formation) the Project file must be documented and no additional assessment is necessary.

3.5.2.2 Existing Conditions

The open pit, WRDFs, processing facilities, and a portion of the TSFs would be located in, on, or adjacent to the Mount Hope igneous complex, which consists of rhyolitic intrusive and extrusive rocks, and thus represents a subvolcanic erosion level of a mid-Tertiary eruptive center (see Section 3.4). The western cauldron, approximately 3,300 feet in diameter, is outlined by the partial ring dike northwest and north northeast of the summit of Mount Hope and juxtaposes a 1,000-foot thick section of the lower cooling unit of the Mount Hope tuff against Vinini Formation. There would be no fossils in the rhyolitic rocks because fossils do not occur in volcanic intrusive or extrusive rocks. The extensive and complicated faulting that has occurred would also preclude stratigraphic accuracy if fossils were encountered. These units would be considered as Class 1 - Very Low.

The Devonian-Ordovician Vinini Formation is widely exposed south and west of the Mount Hope igneous complex. Thin to medium bedded shale, siltstone, chert, and conglomerate

predominate; quartzite and sandy limestone are also present. One thin but persistent sandy limestone unit divides the section into a lower sequence of dominantly argillaceous rocks, cropping out to the west, and a chert and quartzite rich upper unit to the east. The limestone bed dips and thickens easterly and may correlate with skarn present in the deep subsurface. Along the southeast side of the Mount Hope complex, the basal limestone unit of the Permian Garden Valley Formation has been preserved in a small asymmetrical syncline and overlies Vinini Formation in unconformable or possibly thrust contact. Hydrothermal alteration and mineralization affect nearly all of the Mount Hope complex and a wide area of adjacent Paleozoic sedimentary rocks. Drilling to a depth of 2,888 feet in the vicinity of the Mount Hope complex has failed to intercept lower plate carbonate rocks, which could potentially contain fossils. Patterns of alteration and metal zoning are well developed and nearly all of the original textures in both the volcanic and sedimentary rocks have been destroyed. Mapping and petrographic study allow correlation of alteration effects in igneous rocks with those in the Vinini Formation which have been metamorphosed. Any fossil presence would have been destroyed in this process. These units would be considered as Class 1 - Very Low.

The TSF constructed south of Mount Hope would be constructed in soils that overlie lacustrine and basin fill sediments. Exploration drilling southwest of Mount Hope has identified thick sequences of lacustrine deposits adjacent to the mountain front. Data from deep oil and gas exploration wells indicate that Tertiary and early Quaternary basin fill deposits are fine grained and contain considerable amounts of clay. The thickness of Tertiary deposits ranges from tens of feet to thousands of feet. Quaternary sediments in the Project Area are typically coarse grained fluvial sediments derived from the adjacent mountain blocks, fine and coarse grained alluvial fan deposits, and fine grained playa deposits. The potential exists for fossils to occur within the lacustrine lake beds; however, these fossils would be buried to an unknown depth. There is also the possibility that vertebrate fossils could be found in lake bed and spring related sediments or paleo-channel material such as the mammoth tusk that was found in Crescent Valley near the Cortez mine (BLM 2008a). Sporadic and unremarkable mammoth remains are known from many locations in Quaternary lake bed and spring related sediments throughout Nevada (BLM 1996a). These units would be considered as Class 2 - Low and 3b - Unknown.

No paleontological resources of critical scientific or educational value are known to occur within the Project Area. The nearest important fossil locality is located in the Roberts Mountains region where significant vertebrate microfossils have been recovered from the same base strata that the Mount Hope igneous complex possibly intruded. Turner and Murphy (1988) report the discovery of Siluro-Devonian vertebrate microfossils within the Roberts Mountains and Burrow (2003) describes the remains of an upper Silurian acanthodian, *Poracanthodes punctatus*, which extends the known geographic range of the taxon outside of the circum-Arctic.

Paleontological resources have been discovered in the Roberts Mountains, especially Vinini Creek, Pete Hanson Creek, and Cottonwood Canyon, and are significant for their invertebrate fossil resources because they have yielded numerous new species. Johnson (1962) reports a previously unrecorded species of brachiopod, leading to the designation of a new Middle Devonian zone from rocks in the Roberts Mountains. Ausich (1978) reports a new species of *Pisocrinus* from the Roberts Mountains which expanded the known range for this type of Silurian crinoid. Stone and Berdan (1984), based on investigations of the Late Silurian strata of the Roberts Mountains, identified three new genera and 18 new species of ostracodes. Finney et al. (2007) state, “A continuous trench exposure within the uppermost type Vinini Formation at Vinini Creek, Roberts Mountains, Nevada, provides an unparalleled opportunity to examine the

fate of graptolites, prominent Paleozoic zooplankton, during most of the Hirnantian mass extinction event".

3.5.3 Environmental Consequences and Mitigation Measures

3.5.3.1 Significance Criteria

The Proposed Action or an alternative would have a significant effect on the environment if there were sensitive paleontological resources within the Project Area that would be affected by the Project's activities.

3.5.3.2 Assessment Methodology

Impacts of the Proposed Action and Project Alternatives were assessed based on review of geologic maps and reports that have been completed in the Project Area. The significance of the impacts was evaluated based on the significance criteria listed above and through analysis based on IM Nos. 2008-009 and 2009-011.

3.5.3.3 Proposed Action

Project components associated with the open pit, WRDFs, and the processing facilities would be located in an area of geologic units that are identified as Class 1. Thus these components would have essentially no potential to impact significant paleontological resources. The TSFs and the water production field would be located in areas with Tertiary lacustrine and Quaternary basin fill sediments that could contain paleontological resources of critical scientific or educational value, and these geologic units are identified as either Class 2 or 3b. BLM review of paleontological resources found no known vertebrate or invertebrate fossils in the Project Area.

Since fossils are usually buried, their locations cannot be confirmed unless excavation occurs in those geologic units. The TSFs would be constructed on the lower portion of the soil horizons in those areas and thus would not excavate those underlying geologic units. Activities within the water production area would also occur within the soil horizons or as drilling through the geologic units. These types of activities would have no impacts to these geologic units with questionable importance for paleontological resources; therefore, the Proposed Action would not impact paleontological resources of critical scientific or educational value.

3.5.3.4 No Action Alternative

As a result of the No Action Alternative, there would be no impacts to paleontological resources since the permitted activities consist of drilling and soil excavations, which would not affect the underlying geologic formations.

3.5.3.5 Partial Backfill Alternative

Project components associated with the open pit, WRDFs, and the processing facilities under this alternative would be located in an area of geologic units that are identified as Class 1. Thus these components would have essentially no potential to impact significant paleontological resources. The TSFs and the water production field would be located in areas with Tertiary lacustrine and Quaternary basin fill sediments that could contain paleontological resources of critical scientific

or educational value, and these geologic units are identified as either Class 2 or 3b. BLM review of paleontological resources found no known vertebrate or invertebrate fossils in the Project Area.

Since fossils are usually buried, their locations cannot be confirmed unless excavation occurs in those geologic units. The TSFs would be constructed on the lower portion of the soil horizons in those areas and thus would not excavate those underlying geologic units. Activities within the water production area would also occur within the soil horizons or as drilling through the geologic units. These types of activities would have no impacts to these geologic units with questionable importance for paleontological resources; therefore, the Partial Backfill Alternative would not impact paleontological resources of critical scientific or educational value.

3.5.3.6 Off-Site Transfer of Ore Concentrate for Processing Alternative

Project components associated with the open pit, WRDFs, and the processing facilities under this alternative would be located in an area of geologic units that are identified as Class 1. Thus these components would have essentially no potential to impact significant paleontological resources. The TSFs and the water production field would be located in areas with Tertiary lacustrine and Quaternary basin fill sediments that could contain paleontological resources of critical scientific or educational value, and these geologic units are identified as either Class 2 or 3b. BLM review of paleontological resources found no known vertebrate or invertebrate fossils in the Project Area.

Since fossils are usually buried, their locations cannot be confirmed unless excavation occurs in those geologic units. The TSFs would be constructed on the lower portion of the soil horizons in those areas and thus would not excavate those underlying geologic units. Activities within the water production area would also occur within the soil horizons or as drilling through the geologic units. These types of activities would have no impacts to these geologic units with questionable importance for paleontological resources; therefore, the Off-Site Transfer of Ore Concentrate for Processing Alternative would not impact paleontological resources of critical scientific or educational value.

3.5.3.7 Slower, Longer Project Alternative

Project components associated with the open pit, WRDFs, and the processing facilities would be located in an area of geologic units that are identified as Class 1. Thus these components would have essentially no potential to impact significant paleontological resources. The TSFs and the water production field would be located in areas with Tertiary lacustrine and Quaternary basin-fill sediments that could contain paleontological resources of critical scientific or educational value, and these geologic units are identified as either Class 2 or 3b. BLM review of paleontological resources found no known vertebrate or invertebrate fossils in the Project Area.

Since fossils are usually buried, their locations cannot be confirmed unless excavation occurs in those geologic units. The TSFs would be constructed on the lower portion of the soil horizons in those areas and thus would not excavate those underlying geologic units. Activities within the water production area would also occur within the soil horizons or as drilling through the geologic units. These types of activities would have no impact to these geologic units with questionable importance for paleontological resources; therefore, the Slower, Longer Project Alternative would not impact paleontological resources of critical scientific or educational value.

3.6 Air and Atmospheric Values

3.6.1 Regulatory Framework

Ambient air quality and the emission of air pollutants are regulated under both federal and state laws and regulations. Regulations potentially applicable to the Proposed Action and alternatives include the following: National Ambient Air Quality Standards (NAAQS); Nevada State Ambient Air Quality Standards (NSAAQS); Prevention of Significant Deterioration (PSD); New Source Performance Standards (NSPS); Federal Operating Permit Program (Title V); and State of Nevada air quality regulations (NAC 445B). The federal and state **ambient air quality standards** are presented in Table 3.6-1.

3.6.1.1 Federal Clean Air Act

The Federal CAA, and the subsequent CAA Amendments of 1990 (CAAA), require the EPA to identify NAAQS to protect the public health and welfare. The CAA and the CAAA establish NAAQS for seven pollutants, known as "criteria" pollutants because the ambient standards set for these pollutants satisfy "criteria" specified in the CAA. The criteria pollutants regulated by the CAA and their currently applicable NAAQS set by the EPA are listed in Table 3.6-1. The list of criteria pollutants is amended by the EPA as needed to protect public health and welfare. The most recent revisions include amendments to standards for the following pollutants (dates represent publication in the FR): particulate matter less than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$) and particulate matter less than ten micrometers in aerodynamic diameter (PM_{10}) (October 2006), ozone ($O_{3)}$ (March 2008), Pb (November 2008), nitrogen dioxide (NO_2) (February 2010), and SO_2 (June 2010). The EPA recently proposed to update the 8-hour O_3 standard (see 75 FR 2938-3052) from 0.075 ppm to somewhere between 0.060-0.070 ppm; a proposed standard is expected in 201**3 or later**. These revised limits will not be enforceable within the State of Nevada until the Nevada State Implementation Plan (SIP) is amended by the BAPC and formally approved by the EPA. **However, this NEPA analysis must compare results to all state and federal ambient air quality standards.** The current NAAQS are listed in Table 3.6-1.

3.6.1.2 Nevada State Ambient Air Quality Standards

NAC 445B.22097 includes ambient air quality standards for the State of Nevada (Table 3.6-1). The NSAAQS are generally identical to the NAAQS, with the exception of the following: (a) the 8-hour O_3 standard revised by the EPA in 2008, (b) an additional state standard for carbon monoxide (CO) in areas with an elevation in excess of 5,000 feet amsl; (c) the recently promulgated 1-hour NAAQS standards for NO_2 and SO_2, (d) the state standard for PM_{10} (Annual Arithmetic Mean) where the comparable NAAQS standard was revoked by the EPA in 2006; (e) the 24-hour and annual NAAQS standards for $PM_{2.5}$ promulgated by EPA in 2006; and (f) for some pollutants, the determination of when a violation of a state standard or federal standard occurs.

3.6.1.3 Attainment and Nonattainment Areas

Pursuant to the CAA, the EPA has developed classifications for distinct geographic regions known as air quality management areas **(AQMAs)**. Under these classifications, for each federal criteria pollutant, each air basin (or portion of an AQMA [or "planning area"]) is classified as "in

attainment" if the AQMA has "attained" compliance with (i.e., not exceeded) the adopted NAAQS for that pollutant; is classified as "non-attainment" if the levels of ambient air pollution exceed the NAAQS for that pollutant; or is classified as "maintenance" if the monitored pollutants have **improved** from non-attainment levels to attainment levels. AQMAs for which sufficient ambient monitoring data are not available are designated as "attainment-unclassifiable" for those particular pollutants until actual monitoring data support formal "attainment" or "non-attainment" classification.

In addition to the designations relative to attainment of conformance with the NAAQS, the CAA requires the EPA to place each planning area within the U.S. into one of three classes, which are designed to limit the deterioration of air quality when it is "better than" the NAAQS. "Class I" is the most restrictive air quality category and was created by Congress to prevent further deterioration of air quality in National Parks and Wilderness Areas of a given size which were in existence prior to 1977, or those additional areas that have since been designated Class I under federal regulations (40 CFR 52.21). All remaining areas outside of the designated Class I boundaries were designated Class II planning areas, which allow a relatively greater deterioration of air quality once the Minor Source Baseline Date has been set. No Class III areas have been designated. Regardless of the class of the planning area, the air quality cannot exceed the NAAQS. The nearest Class I planning area to the Project, the Jarbidge Wilderness Area, is located approximately 130 miles northeast of the Project Area. There are no Class I airsheds within 60 miles (approximately100 kilometers) of the Project Area.

Table 3.6-1: Federal and State Ambient Air Quality Standards for Criteria Pollutants

Criteria Pollutant	Averaging Period	Nevada Standards	Federal Standards	
		Concentration[a]	Primary[a]	Secondary[a]
Ozone (O_3)	1-Hour[b]	0.12 ppm (235 µg/m^3)	--	Same as Primary Standards
	8-Hour [b]	---	0.075 ppm (150 µg/m^3)	
Carbon Monoxide (CO)	8-Hour (<5,000') [c]	9 ppm (10.5 mg/m^3)	9 ppm (10 mg/m^3)	---
	8-Hour (≥5,000') [c]	6 ppm (7 mg/m^3)	9 ppm (10 mg/m^3)	
	1-Hour [c]	35 ppm (40.5 mg/m^3)	35 ppm (40 mg/m^3)	
Nitrogen Dioxide (NO_2)	Annual (Arithmetic Average)	53 ppb (100 µg/m^3)	53 ppb (100 µg/m^3)	Same as Primary Standards
	1-Hour[d]	---	100 ppb (188 µg/m^3)	---
Sulfur Dioxide (SO_2)	1-Hour[f]	75 ppb (196 µg/m^3)	196 µg/m^3 (75 ppb)	---
	Annual (Arithmetic Average)	30 ppb (80 µg/m^3)	80 µg/m^3 (30 ppb)	---
	24-Hour [c]	140 ppb (365 µg/m^3)	365 µg/m^3 (140 ppb)	---
	3-Hour [c]	500 ppb (1,300 µg/m^3)	---	1,300 µg/m^3 (500 ppb)
Particulate Matter (PM_{10})	24-Hour [c]	150 µg/m^3	---	Same as Primary Standards
	24-Hour[e] (Based on Averaged Exceedances over Three Years	---	150 µg/m^3	
	Annual Arithmetic Mean	50 µg/m^3	---	

Criteria Pollutant	Averaging Period	Nevada Standards	Federal Standards	
		Concentration[a]	Primary[a]	Secondary[a]
Particulate Matter ($PM_{2.5}$)	24-Hour (Based on the 98th Percentile Averaged over Three Years)	---	35 µg/m^3	Same as Primary Standard
	Annual Arithmetic Mean Averaged Over Three Years	---	15.0 µg/m^3	
Lead (Pb)	Rolling Three-Month Average	---	0.15 µg/m^3	Same as Primary Standards
	Calendar Quarter	1.5 µg/m^3	1.5 µg/m^3	

[a] Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 mm **Hg**. Measurements of air quality are corrected to a reference temperature of 25°C and a reference pressure of 760 mm **Hg** (1,013.2 millibar); units of measure for the standards are ppm by volume, parts per billion (ppb - 1 part in 1,000,000,000) by volume, milligrams per cubic meter of air (mg/m^3), and micrograms per cubic meter of air (µg/m^3).

[b] To attain the 8-hour NAAQS standard, the three-year average of the fourth highest daily maximum 8-hour average O_3 concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008). The EPA revoked the 1-hour standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding"). The 1-hour standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.

[c] A violation of the federal standard occurs on the second exceedance during a calendar year; a violation of the State of Nevada standard occurs on the first exceedance during a calendar year.

[d] The 1-hour nitrogen dioxide standard is attained when the three-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area does not exceed 100 ppb (effective January 22, 2010).

[e] Not to be exceeded more than once per year on average over three years.

[f] To attain this standard, the three-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb. Final rule signed June 2, 2010.

3.6.1.4 Prevention of Significant Deterioration

Federal PSD applicability regulations limit the maximum allowable increase in ambient particulate matter in a Class I planning area, resulting from a major or minor stationary source to four µg/m^3 (annual geometric mean) and eight µg/m^3 (24-hour average). For Class II Planning areas the maximum allowable increase is 17 µg/m^3 (annual geometric mean) and 30 µg/m^3 (24-hour average). Increases in other criteria pollutants are similarly limited. Specific types of facilities that emit, or have the potential to emit, 100 tpy or more of PM_{10} or other criteria air pollutants, or any facility that emits, or has the potential to emit, 250 tpy or more of PM_{10} or other criteria air pollutants, is considered a major stationary source.

Most fugitive emissions are not counted as part of the calculation of emissions for PSD. Major stationary sources are required to notify federal land managers of Class I planning areas within 100 kilometers of the major stationary source. There are no Class I planning areas within 100 kilometers of the Project Area. As stated above, the nearest Class I planning area to the Project Area is the Jarbidge Wilderness Area. The Project air pollutant emission sources under the Proposed Action and alternatives emission sources are minor stationary sources that are not subject to PSD regulatory requirements.

3.6.1.5 New Source Performance Standards

NSPSs were established by the CAA. The standards, which are for new or modified stationary sources, require the sources to achieve the best available control technology. The NSPS apply to

specific types of processes which, in the case of the Proposed Action include certain units used to process metallic minerals. The requirements applicable to these existing units are found in 40 CFR Part 60, Subpart LL (Standards of Performance for Metallic Mineral Processing Plants).

3.6.1.6 Federal Operating Permit Program

As part of the CAA and its subsequent amendments, a facility wide permitting program was established for larger sources of pollution. This program, known as the Title V program, requires that these "major sources" of air pollutants submit a Title V permit application. To be classified as a "major source", a facility must emit more than 100 tpy of any regulated pollutant, ten tpy of any single hazardous air pollutant (HAP), or 25 tpy or more of any combination of HAPs, from applicable sources.

3.6.1.7 Nevada Air Quality Operating Permit

The CAA delegates primary responsibility for air pollution control to state governments, which in turn often delegate this responsibility to local or regional organizations. The SIP was originally the mechanism by which a state set emission limits and allocated pollution control responsibility to meet the NAAQS. The function of a SIP broadened after passage of the 1990 CAAA and now includes the implementation of specific technology based emission standards, permitting of sources, collection of fees, coordination of air quality planning, and PSD of air quality within regional planning areas and statewide. Section 176 of the CAA, as amended, requires that federal agencies must not engage in, approve, or support in any way any action that does not conform to a SIP for the purpose of attaining ambient air quality standards.

The BAPC is the agency in the State of Nevada that has been delegated the responsibility for implementing a SIP (excluding Washoe and Clark Counties, which have their own SIPs). Included in a SIP are the State of Nevada air quality permit programs (NAC 445B.001 through 445B.3485, inclusive) and the NSAAQS (see Table 3.6-1). In addition to establishing the NSAAQS, the BAPC is responsible for permit and enforcement activities throughout the State of Nevada (except in Clark and Washoe Counties).

The Proposed Action and alternatives are located in Eureka County, Nevada. The applicable permitting authority for the county is the BAPC. Before any construction of a potential source of air pollution can occur, an air quality operating permit application must be submitted to the BAPC in order to obtain an Air Quality Operating Permit.

3.6.1.8 Nevada Mercury Control Program

The BAPC is the agency in the State of Nevada delegated the responsibility for regulating the Nevada Mercury Control Program (NMCP). The NMCP became effective in May 2006 with the purpose of achieving **Hg** reduction by utilizing **Hg** control technology through implementation of Nevada Maximum Achievable Control Technology (NvMACT). The NMCP is only applicable to control **Hg** emissions from operations at precious metals mining facilities. The Proposed Action and reasonable alternatives are not subject to the NMCP because none of them would be a precious metal mining facility.

3.6.1.9 Climate Change

The BLM has developed draft guidance in the form of an IM **(**2008-171**)** for the incorporation of climate change into NEPA documents. At present, there is no regulatory program that requires reductions in greenhouse gas (GHG). However, in response to a Supreme Court decision interpreting the CAA, the EPA has published an advance notice of proposed rulemaking seeking public comment on whether GHG emissions should be regulated under the CAA, and if so, by what methods. Congress is also debating legislation that would impose regulatory controls or incentives for reducing GHG emissions.

3.6.2 Affected Environment

3.6.2.1 Study Methods

The existing meteorological and air quality conditions in the air quality study area were obtained from the sources discussed in the following sections. **N**o air quality data have been collected at the Project**, however, one year of hourly onsite meteorological data for the year 2010 have been collected**. Baseline air quality and meteorological conditions representative of the Project Area were assessed using data from the nearby monitoring stations of north central Nevada. In the air dispersion model, **a complete, full year (2010) of the hourly on-site** meteorological data was utilized. Meteorological data from the Ely, Nevada, airport (WBO- 262631), located 80 miles southeast of the Project, was utilized for climate characterization (Figure 3.6.1). The Ely Monitoring Station measures ambient temperature, wind speed, wind direction, and precipitation, at an elevation of approximately 6,260 feet amsl.

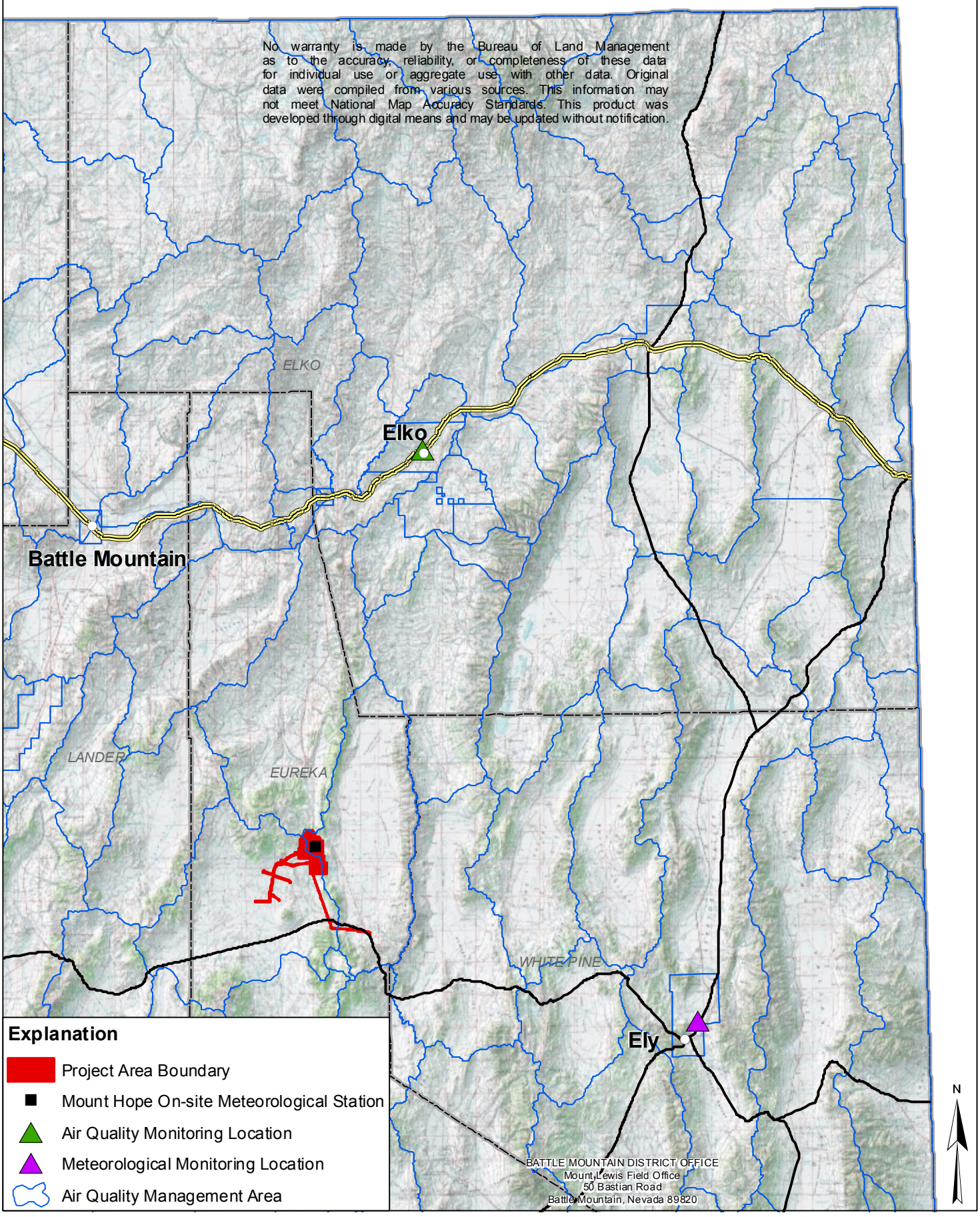
The majority of the Project permitable point source emissions would be located in the Diamond Valley AQMA, which includes the area bounded by the crest of the Sulphur Springs Range, Whistler Mountain, and the Mountain Boy Range on the west and north and the crest of the Diamond Mountains to the east. Fugitive emissions associated with vehicles, vehicle travel, mining, blasting, and material handling would occur in the Diamond Valley AQMA, as well as the Kobeh Valley AQMA. The Kobeh Valley AQMA includes an area bounded on the north by the Roberts Mountains, on the west by the Simpson Park Range, and on the east by Whistler Ridge. The southern boundary is topographically indistinct.

3.6.2.2 Existing Conditions

The Project is not included in any of the source categories listed in the Federal PSD Regulations, and the PSD applicable emissions from the Project are below the 250 tpy PSD threshold. Therefore, the Project is not in a PSD triggered planning area, increment is not being consumed, and the Project is not subject to PSD regulation.

3.6.2.2.1 Climate and Meteorology

The Project Area is a high desert environment characterized by arid to semiarid conditions, with bright sunshine, low annual precipitation, and large daily ranges in temperatures. The climate is controlled primarily by the rugged and varied topography to the west, in particular the Sierra Nevada Mountain Range. Prevailing westerly winds move warm moist Pacific air over the western slopes of the Sierra Nevada where the air cools, condensation takes place, and most of the moisture falls as precipitation. As the air descends the eastern slope, compressional warming takes place resulting in minimal rainfall.



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DESIGN: EMLLC	DRAWN: CVD/GSL	REVIEWED: RFD	
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FILE NAME: p1635_Fig3-6-1_MonitoringSites.mxd

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Mount Hope On-site Meteorological Station, Elko and Ely, Nevada, Monitoring Sites

Figure 3.6.1

Climate information from the Ely airport is representative of the high desert environment. Based on the data collected from the Ely station over the period 1897 through 2006, the average temperature was 44.7°F, with temperatures ranging from 101°F to minus 30°F. Annual precipitation in the area during the same period ranged from zero to 5.52 inches. The mixture of dry desert and mountainous terrain sufficiently dries the air systems that move through the region.

A key component of accessing meteorological effects on an airshed is through atmospheric dispersion. Dispersion is influenced by several parameters, including wind speed, temperature inversions (mixing heights), and atmospheric stability. Prevailing winds in 2007 at the Ely Station were typically from the southwest, with average annual wind speeds at 6.9 miles per hour (mph). Month-to-month variations were small, with average wind speeds ranging from 4.4 to 8.4 mph. These wind speeds tend to promote atmospheric mixing and generally transport locally generated air emissions away from the area. Beneficial air movement that vents an airshed is defined as an "unstable" atmospheric condition.

In "stable" atmospheric conditions, inversions would restrict vertical movement of the air in the lower atmosphere. Atmospheric pollutants are prevented from mixing with the air above the inversion layer. The resulting lower mixing heights produce higher pollutant concentrations since the volume of air with which the pollutants can mix is limited. In cold night/hot day weather patterns, mixing heights can be quite high in the afternoon versus low mixing heights at night and in the early morning due to nighttime cooling.

Mixing heights in the Project Area are estimated to be highest during the afternoon of summer months at 5,900 feet (annual average), which is conducive for good air dispersion. In the late afternoon, unstable atmospheric conditions that vent and disperse the air are favorable. Adequate mixing of air is needed during summer months when temperatures are higher and pollutants are more reactive on a local scale. During the winter months the opposite occurs. Mixing heights are much lower, approximately 250 feet (annual average), resulting in poor air dispersion. Cooler temperatures, however, effectively slow pollutant reactivity.

3.6.2.2.2 Air Quality

Air quality in the Project Area is governed by both factors of pollutant emissions and meteorological conditions. As discussed above, wind speeds, mixing heights, and stability all affect the circulation and dilution of emissions in the area.

The Project Area is located within an AQMA that is currently in "attainment-unclassifiable" for all pollutants having an air quality standard (40 CFR 81.329). No NO_2, SO_2, or Pb non-attainment areas are located within the State of Nevada. Washoe County, Nevada (within which the city of Reno is located) is the PM_{10}, CO, and O_3 non-attainment area located closest to the Project Area, although it is located more than 100 miles to the west.

At present, the BAPC does not conduct ambient air quality monitoring in the vicinity of the Project. The closest station is located in Elko, Nevada, which is approximately 75 miles northeast (Figure 3.6.1). The site is a State and Local Air Monitoring Site (SLAMS) for continuous monitoring of PM_{10} only. The latest Bureau of Air Quality Planning (BAQP) Trend Report for **1998-**200**9** reported the highest 24-hour ambient PM_{10} concentration to be 1**50** µg/m^3.

The mean concentration measured for a 24-hour period for PM_{10} during 200**9** was only 2**5** µg/m^3 (Table 3.6-2) (http://ndep.nv.gov/baqp/ monitoring/**docs/**trend**.pdf**).

Table 3.6-2: Ambient PM_{10} Monitoring Data from the Elko Site

Year	24-Hour Average PM_{10} Concentration (µg/m^3)		
	1st High	2nd High	Arithmetic Mean
1998	**100**	**70**	**22**
1999	**80**	**80**	**25**
2000	**90**	**80**	**25**
2001	**100**	**70**	**25**
2002	**150**	**90**	**22**
2003	**110**	**80**	**19**
2004	**80**	**70**	**21**
2005	**90**	**70**	**21**
2006	**130**	**130**	**26**
2007	**90**	**90**	**26**
2008	**40**	**40**	**15**
2009	**140**	**130**	**25**
Average	100.0	**83.3**	**22.7**

3.6.2.2.3 Climate Change

Ongoing scientific research has identified the potential impacts of anthropogenic (man-made) GHG emissions and changes in biological **C** sequestration due to land management activities on global climate. Through complex interactions on a regional and global scale, these GHG emissions and net losses of biological **C** sinks cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into space. Although GHG levels have varied for millennia, recent industrialization and burning of fossil **C** sources have caused carbon dioxide equivalent (CO_2(e)) concentrations to increase dramatically, and are likely to contribute to overall global climatic changes. The Intergovernmental Panel on Climate Change (IPCC) in 2007 concluded that "warming of the climate system is unequivocal" and "most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations" (IPCC 2007a).

Global mean surface temperatures have increased nearly 1.8˚F from 1890 to 2006. Models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Northern latitudes (above 24˚N) have exhibited temperature increases of nearly 2.1 ˚F since 1900, with nearly a 1.8˚F increase since 1970 alone. Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of GHGs are likely to accelerate the rate of climate change.

In 2001, the IPCC indicated that by the year 2100, global average surface temperatures would increase 2.5 to 10.4˚F above 1990 levels. The National Academy of Sciences has confirmed these findings, but also has indicated there are uncertainties regarding how climate change may

affect different regions. Computer model predictions indicate that increases in temperature would not be equally distributed, but are likely to be accentuated at higher latitudes. Warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures is more likely than increases in daily maximum temperatures. Increases in temperatures would increase water vapor in the atmosphere, and reduce soil moisture, increasing generalized drought conditions, while at the same time enhancing heavy storm events. Although large-scale spatial shifts in precipitation distribution may occur, these changes are more uncertain and difficult to predict. "As with any field of scientific study, there are uncertainties associated with the science of climate change. This does not imply that scientists do not have confidence in many aspects of climate change science. Some aspects of the science are known with virtual certainty, because they are based on well-known physical laws and documents trends" (EPA 2008a).

Several activities contribute to the phenomena of climate change, including emissions of GHGs (especially CO_2 and methane) from fossil fuel development, large wildfires and activities using combustion engines; changes to the natural **C** cycle; and changes to radiative forces and reflectivity (albedo). It is important to note that GHGs would have a sustained climatic impact over different temporal scales. For example, recent emissions of CO_2 can influence climate for 100 years.

It may be difficult to discern whether global climate change is already affecting resources, let alone the area of the Proposed Action. In most cases there is more information about potential or projected effects of global climate change on resources. It is important to note that projected changes are likely to occur over several decades to a century. Therefore, many of the projected changes associated with climate change may not be measurably discernible within the reasonably foreseeable future.

3.6.3 Environmental Consequences and Mitigation Measures

The Project would require an Air Quality Operating Permit from the BAPC. The main impact related to air quality would be the result of increased pollutant concentrations. The Project would increase emissions of regulated pollutants from PSD applicable sources and sources applicable to the NSPS regulations. The Project would not result in emissions of any regulated pollutant above 250 tpy**; therefore,** the Project **is not subject** to PSD regulations or Title V application requirements.

3.6.3.1 Significance Criteria

The Proposed Action would have a significant effect on the environment if any of the following would occur:

- Violate any regulatory requirement of the BAPC;
- Violate any state or federal ambient air quality standard;
- Contribute substantially to an existing or projected air quality violation; or
- Expose sensitive receptors to substantial pollutant concentrations.

3.6.3.2 Assessment Methodology

In order to evaluate the impacts of the Project, an assessment of the significance of the impacts was made based on the significance criteria listed above. The air quality analyses quantified the emissions of the applicable criteria pollutants from the mining and processing of ore from the Project.

An air dispersion modeling analysis was utilized to characterize the Project. The air pollution sources at the Project that were modeled in the air dispersion modeling analysis include the following source categories:

- Process emission points (material handling, crushing, conveying, leaching, drying, roasting, etc.);
- Auxiliary sources (emergency generators, etc.); and
- Fugitive emission sources (drilling, blasting, loading, unloading, hauling, wind erosion, mobile machinery tailpipes, etc.).

Air emission estimates were calculated based on the maximum material throughput for each applicable time period, using EPA approved AP-42 emission factors for the Project and information provided by EML. Table 3.6-3 shows the emissions, in tpy, that were used in the model **for this EIS analysis**.

3.6.3.2.1 Model Selection and Options

The most recent version (**11353**) of the AERMOD modeling system was used for the air quality impact analyses. AERMOD was run using regulatory default options (Air Sciences Inc. 201**2**a; EML 2008b).

Process and insignificant sources with exhaust stacks such as generators, boilers, dryer, roasters, baghouse/dust collector equipped dust sources (crusher, apron feeder, etc.), and process fugitive sources such as truck dump and conveyors are modeled as point sources. All fugitive source activities such as the pit, the primary crusher stockpile, the waste storage sites, the coarse and low-grade ore storage sites, and the tailings storage facility are modeled as volume sources. Each haul road section is characterized by a series of volume sources with length not exceeding twice the road width (Air Sciences Inc. 201**2**a).

Table 3.6-3: Modeled Emission Rates

Model and Source Category	Annual Emissions (tons/year)					
	PM_{10}	$PM_{2.5}$	NO_2	SO_2	CO	VOC[1]
Point and Process Fugitive Sources	**98.1**	**86.6**	**61.2**	**98.1**	**22.2**	49.2
Fugitive and Tailpipe Sources	**876.9**	**111.3**	**881.7**	**64.2**	**1,326.5**	263.0
Total	**975.0**	**197.9**	**942.9**	**162.4**	**1,348.7**	312.2

[1](VOC) volatile organic compound.

The effects of building induced downwash were incorporated into the air quality modeling analyses. Building downwash parameters were calculated using the most recent version of the

Building Profile Input Program (BPIP) with Plume Rise Model Enhancement (PRIME) algorithm (BPIP-PRIME version 04274) and the August 28, 2008, version of the buildings layout (Air Sciences Inc. 201**2**a).

3.6.3.2.2 Receptors

The receptor data were utilized in the modeling analyses to access ground level impacts from the Project facility emissions**. Discrete receptors located at 100-meter spacing out to two kilometers in each direction from the facility boundary were included. Receptors within the fenced boundary were not modeled since these receptors inside the boundary would not be considered ambient.**

Receptors placed at a 25-meter spacing along the facility public exclusion boundary line are also included in the models. Receptors within the facility public exclusion boundary were not modeled.

A group of sensitive receptors has been evaluated in the air dispersion modeling analysis. This group includes receptors placed at nearby ranches, permanent dwellings, designated campgrounds, and the Town of Eureka. These sensitive receptors are provided in the Table 3.6-4.

Table 3.6-4: Sensitive Receptors and Universal Transverse Mercator Coordinates

Receptor	Universal Transverse Mercator (UTM) Coordinates	
	Easting (meters [m])	Northing (m)
Bailey North Ranch	**580,043**	**4,419,188**
Bailey South Ranch	**581,599**	**4,396,519**
Benson	**584,817**	**4,396,554**
Eureka County High School	**588,204**	**4,374,062**
Eureka Elementary School	**589,341**	**4,373,756**
Eureka County Medical Clinic	**589,358**	**4,374.008**
Alpha Ranch	**568,465**	**4,428,941**
Roberts Creek Ranch	**560,933**	**4,400,378**
Tonkin Reservoir	**550,030**	**4,418,098**

In addition, 100 receptors each along the boundaries of the Jarbidge Wilderness Area (a designated federal Class I area) and the Great Basin National Park that were closest to the Project Area were also modeled.

All the receptors are processed with the AERMOD Terrain preprocessor AERMAP to generate receptor terrain elevations and hill height values using the 30-meter resolution USGS 7.5-minute

Digital Elevation Model (DEM) Files (Air Sciences, Inc. 201**2**a). The modeled sources, fenceline, and receptor grid locations are shown in Figure 3.6.2.

3.6.3.2.3 Meteorological Data

A complete full year (2010) hourly on-site meteorological data were utilized. **Missing data were substituted with the upper-air (soundings) and cloud cover data from the Elko station and surface data from the Eureka Airport station. The most recent version (11059) of the AERMOD meteorological preprocessor AERMET was used to process these data and generate AERMOD input-ready meteorological data files (Air Sciences, Inc. 2012a)**. A wind frequency distribution of the meteorological data is illustrated on Figure 3.6.3.

3.6.3.2.4 Modeled Pollutants and Assumptions

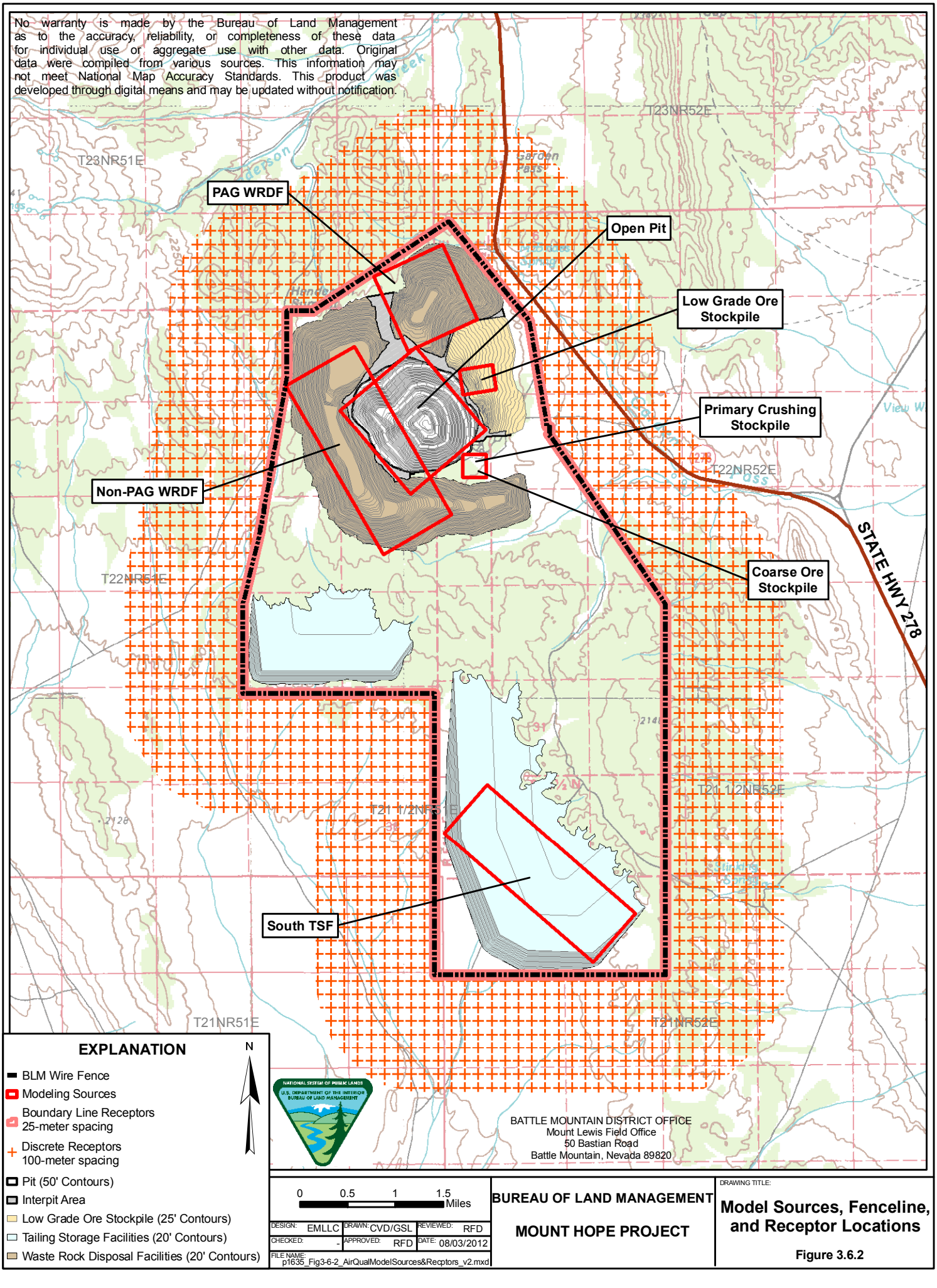
The air quality impact analyses include modeling for the following air pollutants and averaging periods. These data are presented in Table 3.6-5.

Table 3.6-5: Air Pollutants and Applicable Averaging Times for the Air Quality Modeling

Pollutant	Averaging Time[a]
PM_{10}	24-Hour
	Annual
$PM_{2.5}$	24-Hour
	Annual
Pb	Quarterly
CO	1-Hour
	8-Hour
NO_2	1-Hour
	Annual
SO_2	1-Hour
	3-Hour
	24-Hour
	Annual

[a] All concentrations are applicable at any point of public access.

Pb emissions were calculated by multiplying the Pb constituent with PM emissions, which are calculated based on PM_{10}/PM ratio of 0.35. **The Pb NAAQS is based on a three-month rolling averaging period. A monthly averaging period was used to model Pb emissions because the AERMOD does not have an option for modeling a three-month averaging period. The maximum monthly concentrations are higher than the three-month rolling average concentrations, therefore, comparison of the maximum monthly concentrations to the**


No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.
PAG WRDF
Open Pit
Low Grade Ore Stockpile
Primary Crushing Stockpile
Non-PAG WRDF
Coarse Ore Stockpile
South TSF
STATE HWY 278
T23NR51E
T23NR52E
T22NR51E
T22NR52E
T21 1/2NR51E
T21 1/2NR52E
T21NR51E
T21NR52E
EXPLANATION
BLM Wire Fence
Modeling Sources
Boundary Line Receptors 25-meter spacing
Discrete Receptors 100-meter spacing
Pit (50' Contours)
Interpit Area
Low Grade Ore Stockpile (25' Contours)
Tailing Storage Facilities (20' Contours)
Waste Rock Disposal Facilities (20' Contours)
N
NATIONAL SYSTEM OF PUBLIC LANDS
U.S. DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT
BATTLE MOUNTAIN DISTRICT OFFICE
Mount Lewis Field Office
50 Bastian Road
Battle Mountain, Nevada 89820
0 0.5 1 1.5 Miles
DESIGN: EMLLC
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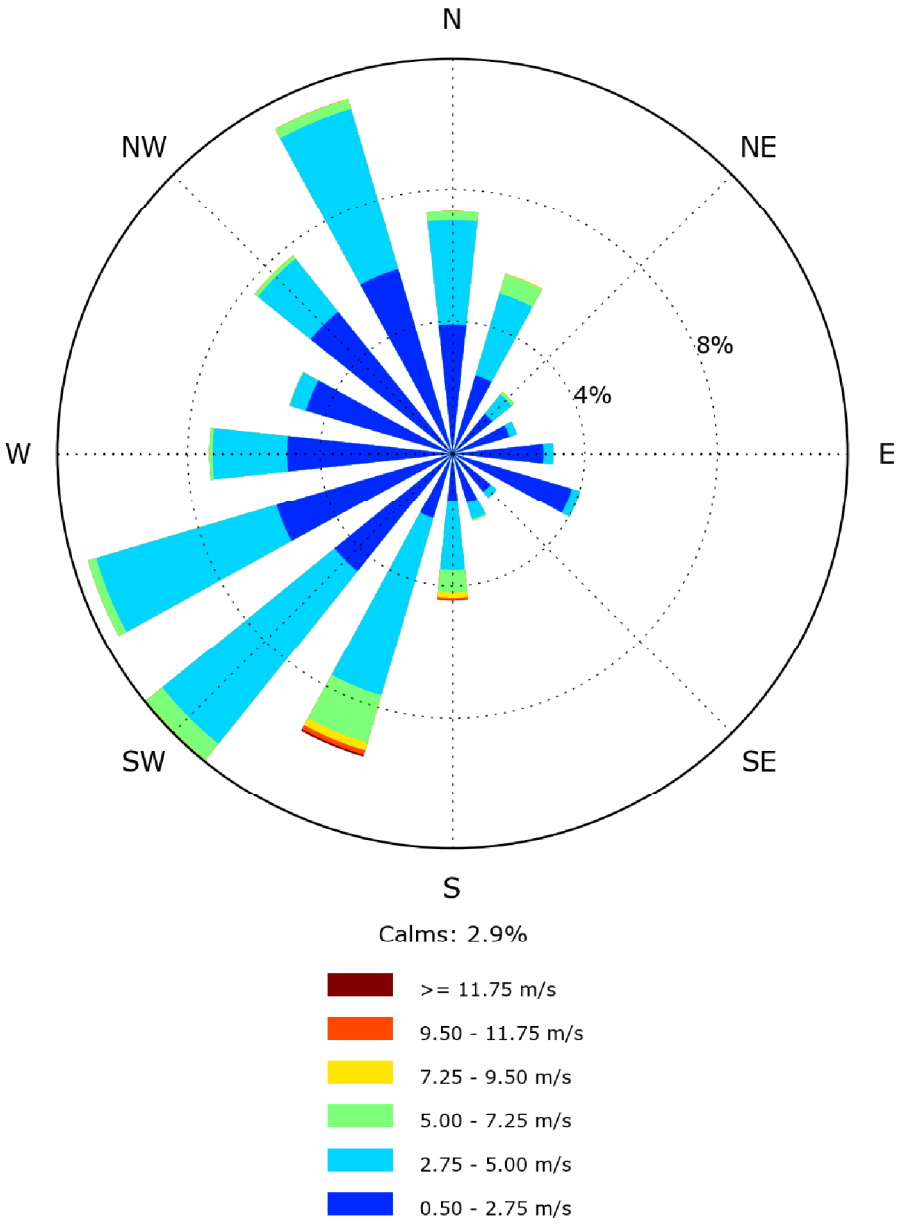
APPROVED: RFD
DATE: 08/03/2012
FILE NAME: p1635_Fig3-6-2_AirQualModelSources&Recptors_v2.mxd
BUREAU OF LAND MANAGEMENT
MOUNT HOPE PROJECT
DRAWING TITLE:
Model Sources, Fenceline, and Receptor Locations
Figure 3.6.2



Note: The wind direction in the figure is the direction from which the wind is blowing.

BATTLE MOUNTAIN DISTRICT OFFICE Mount Lewis Field Office 50 Bastian Road Battle Mountain, Nevada 89820	BUREAU OF LAND MANAGEMENT MOUNT HOPE PROJECT	DRAWING TITLE: **Mount Hope 2010 On-site Meteorology - Wind Frequency Distribution Diagram**	
DESIGN: EMLLC / DRAWN: CVD / REVIEWED: RFD CHECKED: - / APPROVED: RFD / DATE: 08/06/2012 FILE NAME: p1635_Fig3-6-3_WindRose_v2.mxd		**Figure 3.6.3**	

three-month rolling average concentrations is conservative approach to estimating the concentration (Air Sciences Inc. 201**2**a).

The maximum design rates are used to estimate the emissions from stacks and process fugitive sources, and the fugitive emissions are based on the mine year production rates (Air Sciences Inc. 201**2**a).

In order to conduct the **NEPA modeling** analysis efficiently and without generating and analyzing cumbersome data**, a screening modeling analysis was conducted for all 32 years of active mine life.** The results of the screening model showed that the highest impacts were driven by either of the two WRDFs or the LGO Stockpile. Based upon these findings, the mine production years representing the highest **emissions in the PAG storage area and LGO stockpile, along with all other sources, were selected for each pollutant and modeled with one year of on-site meteorological data. Regulatory default options in AERMOD were used to estimate the ground-level concentrations for all the pollutants and averaging period except for NO_2. The non-default option of the Plume Volume Molar Ratio Method (PVMRM), a Tier 3 method from 40 CFR 51, Appendix W, was used to estimate the NO_2 concentrations.** (Air Sciences Inc. 201**2**a).

The mine production years chosen for the NEPA modeling and the selection criteria are presented in Table 3.6-6. The sensitive receptors along the Jarbidge Wilderness Area and the Great Basin National Park were modeled separately from the boundary and grid receptors. The highest emissions for mine production Years **1,** 6**, 16, 20, 24, 27** and **32** for all pollutants **except annual PM_{10} and old SO_2 standards (24-hour and annual)**, was modeled with **one year of on-site** meteorological data set. **The modeling of the annual PM_{10} and old SO_2 standards is from the modeling information presented in the Draft EIS.**

Table 3.6-6: Modeled Mine Production Years and Selection Criteria

Pollutant	Mine Production Year	Selection Criteria
All	Year 24	Highest cumulative and individual emissions for all pollutants
	Year 6	Year of highest impact in screen model runs
CO	Year 1	Highest emissions in PAG
	Year 27	Highest emissions in Non-PAG
	Year 16	Highest emissions in LGO Stockpile
NO_2	Year 24	Highest emissions in PAG
	Year 27	Highest emissions in Non-PAG
	Year 16	Highest emissions in LGO Stockpile
PM_{10}, $PM_{2.5}$, and Pb	Year 1	Highest emissions in PAG
	Year 20	Highest emissions in Non-PAG
	Year 16	Highest emissions in LGO Stockpile
SO_2	Year 1	Highest emissions in PAG
	Year 27	Highest emissions in Non-PAG
	Year 32	Highest emissions in LGO stockpile

3.6.3.2.5 Applicable Air Quality Standards

The background concentrations are added to the modeled impact to estimate the total pollutant concentrations, which were compared with the NAAQS for compliance demonstrations. The NAAQS are presented in Table 3.6-1.

3.6.3.2.6 Background Concentrations

To assess the impact of the Project on the ambient air quality, it was necessary to account for existing, or background, levels for each pollutant. No monitoring has been performed within the Project Area for ambient concentrations of CO, NO_2, O_3, or SO_2, nor does the BAPC specify background concentrations for these pollutants. However, background values are necessary for the purpose of comparing modeled results to the NAAQS and NSAAQS. **The BAPC was contacted to obtain representative background concentrations for the modeling analysis. The BAPC recommended background concentrations are presented in Table 3.6-7.**

Table 3.6-7: Background Values for Criteria Pollutants

Pollutant	Averaging Period	Monitor Location	Year	Background Concentration ($\mu g/m^3$)	Reference
PM_{10}	24-Hour	NV Rural Area Default, **Great Basin NP**	**N/A**	10.2	BAPC
	Annual	NV Rural Area Default	**N/A**	9.0	BAPC
$PM_{2.5}$	24-Hour[3]	Great Basin NP	2005-2007	7.0	**BAPC [1]**
	Annual[4]	Great Basin NP	2005-2007	2.4	BAPC
CO	1-Hour	**N/A**	**N/A**	**0**	**BAPC [2]**
	8-Hour	**N/A**	**N/A**	**0**	**BAPC [2]**
NO_2	1-Hour	**N/A**	**N/A**	**0**	**BAPC [2]**
	Annual	**N/A**	**N/A**	**0**	**BAPC [2]**
SO_2	1-Hour	**N/A**	**N/A**	**0**	**BAPC [2]**
	3-Hour	**N/A**	**N/A**	**0**	**BAPC [2]**
	24-Hour	Boulder City, Clark Co., NV	2001-2003	13.1	EPA Air Data*
	Annual	Boulder City, Clark Co., NV	2001-2003	2.6	EPA Air Data*
Pb	Quarterly	**N/A**	**N/A**	0	BAPC

* http:///www.epa.gov/air/data/index.html
[1] Randy Philips, BAPC, March 19, 2008
[2] Greg Remer, BAPC, March 19, 2007
[3] 3-year average of the 98th percentile of 24-hour measurements
[4] 3-year average of the weighted annual mean measurements

The PM_{10} background concentrations are the default Nevada values recommended by the BAPC for unmonitored rural areas like the Project Area. For the $PM_{2.5}$ background, monitoring aerosol data from Great Basin National Park were used. **The BAPC recommends assuming zero background for CO, NO_2, and SO_2 for unmonitored rural areas similar to the Project Area** (Air Sciences Inc. 201**2**a).

3.6.3.3 Proposed Action

The Proposed Action consists of many activities and actions, each of which may have the potential to emit air pollutants. NAC 445B.187 defines "stationary source" as "...any building, structure, facility, or installation, including temporary sources which emits or may emit any regulated air pollutant that is regulated under ... NAC445B.001 to NAC445B.3485." NAC 445B.059 further defines "emission unit" as, "... a part of a stationary source that emits or has the potential to emit any regulated air pollutant." A comprehensive list of the sources of air pollutant emissions, resulting either directly from the Proposed Action or from indirectly related facilities used to process ore from the Proposed Action are presented in Table 3.6-8.

Table 3.6-8: List of Sources Analyzed for the Mount Hope Project

Emission Unit Description	Pollutants*
Primary Crusher **(PC)** Dump Pocket	PM_{10}, $PM_{2.5}$, Pb, HAPs
Primary Crusher & Apron Feeder Discharge	PM_{10}, $PM_{2.5}$, Pb, HAPs
Transfer to Coarse Ore Conveyor	PM_{10}, $PM_{2.5}$, Pb, HAPs
Transfer to Course Ore Stockpile	PM_{10}, HAPs
Reclaim Apron Feeder Transfer	PM_{10}, HAPs
Conveyor Transfer to SAG Mill	PM_{10}, HAPs
Pebble Crusher and Discharge	PM_{10}, HAPs
Sodium Metasilicate Silo Loading	PM_{10}, HAPs
Sodium Metasilicate Silo Unloading	PM_{10}, HAPs
Boiler for Dryer	CO, NO_2, PM_{10}, $PM_{2.5}$, Pb, SO_2, VOC, HAPs
Concentrate Dryer	CO, NO_2, PM_{10}, $PM_{2.5}$, Pb, SO_2, VOC, HAPs
Concentrate Transfer to Roasters via Conveyors, Bins, and Bucket Elevators	PM_{10}, $PM_{2.5}$, Pb, HAPs
Concentrate Roasters (1 and 2)	CO, NO_2, PM_{10}, $PM_{2.5}$, Pb, SO_2, VOC, HAPs
Primary and Secondary Screening	PM_{10}, $PM_{2.5}$, Pb, HAPs
TMO/ Rock Breaker- Roaster Building	PM_{10}, $PM_{2.5}$, Pb, HAPs
TMO Transfer to Packaging via Conveyors, Bins, and Bucket Elevators	PM_{10}, $PM_{2.5}$, Pb, HAPs
Lime Silo 1 Loading	PM_{10}, $PM_{2.5}$, HAPs
Lime Silo 1 Discharge	PM_{10}, $PM_{2.5}$, HAPs
Lime Silo 2 Loading	PM_{10}, $PM_{2.5}$, HAPs
Lime Silo 2 Discharge	PM_{10}, $PM_{2.5}$, HAPs
FeMo Plant- Batch Reactor	PM_{10}, $PM_{2.5}$, Pb, HAPs
FeMo Mixer	PM_{10}, $PM_{2.5}$, Pb, HAPs
FeMo Jaw Crusher	PM_{10}, $PM_{2.5}$, Pb, HAPs
FeMo Transfer to Packaging via Conveyors, Bins, and Bucket Elevators	PM_{10}, $PM_{2.5}$, Pb, HAPs
TMO Transfers, Handling, and Packaging	PM_{10}, $PM_{2.5}$, Pb, HAPs
FeMo Transfers, Handling, and Packaging	PM_{10}, $PM_{2.5}$, Pb, HAPs
Emergency Generator – Portable	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Emergency Generator - Truck Shop	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs

Emission Unit Description	Pollutants*
Emergency Generator - Mill Building	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Emergency Generator - Tailings Pump House	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Boiler - Mill Maintenance - General Heating	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Boiler - Mine Maintenance - General Heating	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Boiler - Filter/Packaging - General Heating	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Boiler - FeMo Plant - General Heating	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
100,000 Gallon #2 Fuel Oil Tank	VOC, HAPs
Diesel Storage Tank	VOC, HAPs
Diesel Storage Tank	VOC, HAPs
Diesel Storage Tank	VOC, HAPs
Boiler - Mill Maintenance - Office Heating	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Boiler - Mill Maintenance - Shower Boiler	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Boiler - Mine Maintenance - Office Heating	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Boiler - Mine Maintenance - Shower Boiler	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Boiler - Truck Wash - General Heating	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Boiler - Truck Wash - Wash Steamer	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Boiler - Administration	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Boiler - Administration	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Boiler - Laboratory - General Heating	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Boiler - Laboratory - Water Heater	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Boiler - Health and Safety - General Heating	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Boiler - Health and Safety - Water Heater	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Boiler - Truck Shop - General Heating	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Antifreeze Storage Tank	VOC, HAPs
Used Antifreeze Storage Tank	VOC, HAPs
Used Oil Storage Tank	VOC, HAPs
Truck Maintenance Fluid Storage Tank	VOC, HAPs
ATF Storage Tank	VOC, HAPs
Engine Oil Storage Tank	VOC, HAPs
Gear Oil Storage Tank	VOC, HAPs
Hydraulic Fluid Storage Tank	VOC, HAPs
Engine Oil Storage Tank	VOC, HAPs
Used Antifreeze Storage Tank	VOC, HAPs
Used Oil Storage Tank	VOC, HAPs
Gasoline Storage Tank	VOC, HAPs
Highway Diesel Storage Tank	VOC, HAPs
Fuel Oil #2/ MIBC Blend Storage Tank	VOC, HAPs
MIBC Storage Tank	VOC, HAPs
Pine Oil Storage Tank	VOC, HAPs
Fuel Oil #2 Storage Tank	VOC, HAPs
Fuel Oil Storage Tank	VOC, HAPs

Emission Unit Description	Pollutants*
Hydrochloric Acid Storage Tank	VOC, HAPs
Drilling	PM_{10}, $PM_{2.5}$, Pb, HAPs
Blasting	CO, NO_2, PM_{10}, $PM_{2.5}$, Pb, $SO_{2,}$ HAPs
HG Ore - In-Pit Loading	PM_{10}, $PM_{2.5}$, Pb, HAPs
HG Ore - Stockpile Unloading	PM_{10}, $PM_{2.5}$, Pb, HAPs
HG Ore - Stockpile Loading	PM_{10}, $PM_{2.5}$, Pb, HAPs
LGO In-Pit Loading	PM_{10}, $PM_{2.5}$, Pb, HAPs
LGO Stockpile Unloading	PM_{10}, $PM_{2.5}$, Pb, HAPs
Waste - In-Pit Loading	PM_{10}, $PM_{2.5}$, Pb, HAPs
Waste - PAG Unloading	PM_{10}, $PM_{2.5}$, Pb, HAPs
Waste – Non-PAG Unloading	PM_{10}, $PM_{2.5}$, Pb, HAPs
LGO Stockpile Loading	HAPs
Wind Erosion - PC Stockpile	PM_{10}, $PM_{2.5}$, Pb, HAPs
Wind Erosion - LG Stockpile	PM_{10}, $PM_{2.5}$, Pb, HAPs
Wind Erosion - PAG	PM_{10}, $PM_{2.5}$, Pb, HAPs
Wind Erosion - Non-PAG	PM_{10}, $PM_{2.5}$, Pb, HAPs
Wind Erosion - Course HG Stockpile	PM_{10}, $PM_{2.5}$, Pb, HAPs
Wind Erosion - Pit to PC Haul Road	PM_{10}, $PM_{2.5}$, Pb, HAPs
Wind Erosion - Pit to Low-Grade Ore Stockpile Haul Road	PM_{10}, $PM_{2.5}$, Pb, HAPs
Wind Erosion - Pit to PAG Haul Road	PM_{10}, $PM_{2.5}$, Pb, HAPs
Wind Erosion - Pit to Non-PAG Haul Road	PM_{10}, $PM_{2.5}$, Pb, HAPs
Wind Erosion - Tailings Storage Facility	PM_{10}, $PM_{2.5}$, Pb, HAPs
Haul - HG Ore to PC & Stockpile	PM_{10}, $PM_{2.5}$, Pb, HAPs
Haul - LG Ore to Stockpile	PM_{10}, $PM_{2.5}$, Pb, HAPs
Haul - Waste to PAG	PM_{10}, $PM_{2.5}$, Pb, HAPs
Haul - Waste to Non-PAG	PM_{10}, $PM_{2.5}$, Pb, HAPs
Haul - LG Stockpile to PC	PM_{10}, $PM_{2.5}$, Pb, HAPs
Tailpipe - Loaders	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Tailpipe - Haul Trucks	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Tailpipe - Dozers	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Tailpipe - Graders	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Tailpipe - Water Trucks	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Tailpipe - Excavators	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Tailpipe - Blasthole Drills	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Tailpipe - Hydraulic Shovel	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs
Paved Road Travel - Commuter Buses	PM_{10}, $PM_{2.5}$, HAPs
Tailpipe - Commuter Buses	CO, NO_2, PM_{10}, $PM_{2.5}$, SO_2, VOC, HAPs

* - Hazardous air pollutant (HAP) emissions could occur from any or all sources.

3.6.3.3.1 PM_{10}, $PM_{2.5}$, and Pb Emissions and Modeled Concentrations

PM_{10} emissions are generated by almost all sources in Table 3.6-8. The major sources of PM_{10} and $PM_{2.5}$ emissions include resuspension of unpaved road dust from haul trucks, wind erosion of the WRDFs and the ore storage stockpiles, as well as processing material using crushers, screens, and conveyors, and emissions from blasting operations. Emission controls such as watersprays help minimize emissions from the material process equipment (i.e., crushers, screens, conveyors, etc.) (AirSciences Inc. 2010; 2011a; 2011b**; 2012a**).

The $PM_{10}/PM_{2.5}$ emissions from the bus transportation of the employees on public roads to and from the Project Area would total 2.86 tpy (AirSciences Inc. 2011c). These emissions would be from engine exhaust, tire and brake wear, and fugitive dust generated from bus travel on paved roads. These emissions would have an incremental impact on the air quality in the vicinity of the transportation route.

The potential for indirect fugitive dust emissions from the ground water production exists as a result of the Proposed Action. As discussed under Section 3.2, the ground water pumping in Kobeh Valley would result in the lowering of the **water** table in Kobeh Valley. As discussed in Section 3.9, a phreatophytic vegetation community exists in Kobeh Valley where the current water table is near the ground surface. Should the water table be lowered a sufficient distance, the current vegetation community in this area may shift to another community, have a lower population density (less individual plants per given area), or there may be an area without any vegetation. Should this occur and there are sufficient activities in that area to keep the soil surface from crusting, then the wind would result in the creation of wind-blown fugitive dust. These emissions would have an incremental impact on the air quality in the vicinity of the Kobeh Valley.

The maximum modeled ambient PM_{10} concentration in the NEPA modeling analysis, including background concentrations, for modeled years of highest impact (Years 1, 6, 16, 20, **24, 27,** and **32**) at any point of public access **is 58.6** µg/ m^3 per 24-hour time period with **2010 on-site** meteorological data, and 20.8 µg/m^3, annual arithmetic average with 1988 meteorological data (Table 3.6-9). The maximum modeled ambient $PM_{2.5}$ concentration in the NEPA modeling analysis, including background concentrations, for modeled years of highest impact (Years 1, 6, 16, 20, **24, 27,** and **32**) at any point of public access are **23.0** µg/ m^3 per 24-hour time period and **6**.5 µg/ m^3, annual arithmetic average with **2010 on-site** meteorological data (Table 3.6-9). The modeled high concentration for Pb is substantially below the NSAAQS and NAAQS standards.

Table 3.6-9: Highest Modeled Air Pollutant Concentrations from the Proposed Action at Receptor Points Accessible to the Public

Pollutant	Averaging Time	Met. Data Year	Highest Modeled Receptor Point			Lowest Applicable Ambient Standard (µg/m^3)
			Receptor Location[1]		Dispersion Modeling Results (µg/m^3)[2]	
			UTM Easting (m)	UTM Northing (m)		
PM_{10}	24-Hour	**2010**	**572,288**	**4,405,086**	**58.6**	150
	Annual	1988	569,680	4,407,572	20.7	50
$PM_{2.5}$	24-Hour	**2010**	**572,317**	**4,404,913**	**23.0**	35

Pollutant	Averaging Time	Met. Data Year	Highest Modeled Receptor Point			Lowest Applicable Ambient Standard (µg/m³)
			Receptor Location[1]		Dispersion Modeling Results (µg/m³)[2]	
			UTM Easting (m)	UTM Northing (m)		
	Annual	**2010**	**572,400**	**4,404,700**	**6.5**	15
SO_2	1-Hour	**2010**	**572,400**	**4,404,600**	**62.3**	196
	3-Hour	**2010**	**572,449**	**4,404,521**	**32.9**	1,300
	24-Hour	1991	567,700	4,405,600	29.3	365
	Annual	1992	572,386	4,404,696	4.3	80
CO	1-Hour	**2010**	**569,825**	**4,407,667**	**324.5**	40,000
	8-Hour (< 5,000')	**2010**	**572,400**	**4,404,700**	**110.0**	10,000
	8-Hour (≥ 5,000')	**2010**	**572,400**	**4,404,700**	**110.0**	6,667
Pb	1-Month	**2010**	**572,308**	**4,404,962**	**0.007**	0.15
NO_2	1-Hour	**2010**	**572,284**	**4,405,111**	**162.1**	188
	Annual	**2010**	**572,400**	**4,404,700**	**14.1**	100

[1] All coordinates in UTM projection, North American Datum 1983.
[2] Background values, as listed in Table 3.6-7 are included.

The modeled high concentration receptor locations for the NEPA modeling analysis is shown in Figure 3.6.4.

■ **Impact 3.6.3.3-1:** Emissions of PM_{10}, $PM_{2.5}$, and Pb would be generated by numerous processes as a result of the Proposed Action, including the resuspension of road dust, wind erosion of exposed dirt surfaces, and activities related to the processing of ore materials. These activities are inherent to the mining process and would be ongoing throughout the life of the Proposed Action. The modeled PM_{10}, $PM_{2.5}$, and Pb concentrations show levels below the NSAAQS and NAAQS, even with the addition of the background values.

Significance of the Impact: This impact is not considered significant.

No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.6.3.3.2 Combustion Emissions and Modeled Concentrations

Combustion of diesel in the haul trucks and mobile equipment, such as loaders, dozers, etc., the combustion of propane in processing units such as the boilers, and the combustion of fuel oil or diesel in units such as the roaster, can produce elevated ambient levels of CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and O_3 (from VOC emissions). In most cases, combustion emissions are generally uncontrolled for the emissions units. Despite the lack of tailpipe emissions control technology for combustion sources throughout the Project Area, the maximum modeled CO, NO_2, and SO_2 concentrations from the modeling analysis is well below either the NSAAQS or the NAAQS.

The modeled results, including background concentrations, for each pollutant for each applicable averaging time are shown in Table 3.6-9.

The CO, NO_2, SO_2, and VOC emissions from the bus transportation of the employees on public roads, to and from the Project Area total 2.32, 4.97, 0.01, and 0.25 tpy**, respectively** (Air Sciences Inc 2011c). These emissions would be from engine exhaust. These emissions would have an incremental impact on the air quality in the vicinity of the transportation route.

- **Impact 3.6.3.3-2:** Combustion emissions of CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and VOC would be generated by numerous processes as a result of the Proposed Action, including combustion emissions from diesel engines and burning propane, fuel oil, or diesel in various process equipment**s**. The modeled CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and VOC show levels below the NSAAQS and NAAQS.

  Significance of the Impact: This impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.6.3.3.3 HAPs Emissions

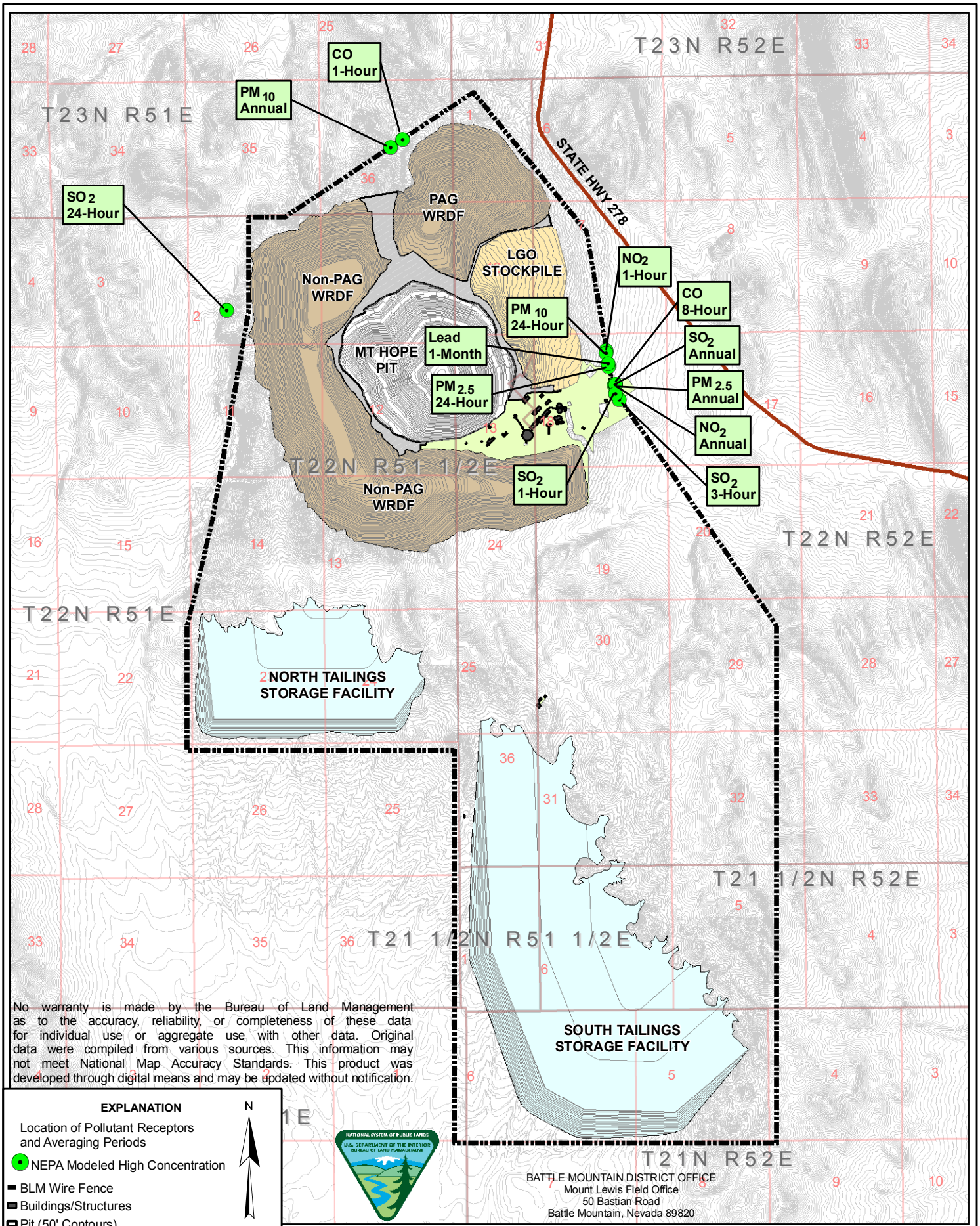
HAPs emissions from the Proposed Action would result from the handling of earthen materials, the combustion of the hydrocarbon fuels, and the handling and use of various chemicals. A summary of the total HAPs emissions that would be emitted from the Proposed Action is presented in Table 3.6-10 (Air Sciences Inc. 201**2**b). The facility-wide HAPs emissions would be **4.53** tpy and Mn would be the highest emitted single HAP at 1.1**6** tpy. These estimated emissions include both fugitive and process sources. EPA thresholds for any single HAP, or for all HAPs combined, are ten and 25 tpy, respectively. With the exception of Pb, there are no ambient air quality standards for HAPs and these emissions would have an incremental impact on the air quality in the vicinity of the Project Area. Pb is a criteria pollutant, as mentioned previously in the text.

3.6.3.3.4 Sensitive Receptors Effects

Dispersion modeling was also performed to determine the impacts on the "sensitive" receptors listed in Section 3.6.3.2.2 for the NEPA analysis. The highest 24-hour PM_{10} impact from the Proposed Action on the defined sensitive receptors was found to be **14.3** µg/ m^3 at the Roberts Creek Ranch. The highest annual PM_{10} impact from the Proposed Action on the defined sensitive receptors was found to be 1.091 µg/ m^3, also at the Roberts Creek Ranch (Table 3.6-11).

The NEPA modeling analysis was also performed to determine the impacts of the gaseous pollutants from the Proposed Action on the defined sensitive receptors, including the Jarbidge Wilderness, for each applicable averaging time shown in Table 3.6-11. In all instances, the concentrations are a small fraction of the ambient standards, and in the case of the Jarbidge Wilderness, much less than the PSD Class I increments.

The highest 24-hour and annual PM_{10} concentrations modeled from the Proposed Action emissions at the Jarbidge Wilderness Area are 0.1 µg/m^3 and 0.008 µg/m^3, respectively. Although the Project is not subject to limitations by the PSD Class I increments (8 µg/m^3 and



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

EXPLANATION

Location of Pollutant Receptors and Averaging Periods

- NEPA Modeled High Concentration
- BLM Wire Fence
- Buildings/Structures
- Pit (50' Contours)
- Interpit Area
- Low Grade Ore Stockpile (25' Contours)
- Tailing Storage Facilities (20' Contours)
- Waste Rock Disposal Facilities (20' Contours)
- Yard

N

0 2,000 4,000 6,000 Feet

BATTLE MOUNTAIN DISTRICT OFFICE
Mount Lewis Field Office
50 Bastian Road
Battle Mountain, Nevada 89820

DESIGN: EMLLC	DRAWN: CVD/GSL	REVIEWED: RFD	
CHECKED: -	APPROVED: RFD	DATE: 08/02/2012	

FILE NAME: p1635_Fig3-6-4_ModeledHighPollutants_v3.mxd

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Modeled Highest Pollutant Concentrations for the Proposed Action

Figure 3.6.4

4 g/m^3, 24-hour and annual averaging times, respectively), the ambient concentration increases modeled from Proposed Action emissions values are far below these PSD Class I increments and the EPA's modeling significance level of 1 µg/m^3.

Table 3.6-10: HAPs Emissions for the Mount Hope Project

HAPs	Facility Total (tpy)	Fugitive Sources (tpy)	Process Sources (tpy)
Formaldehyde	**0.074**	**0.056**	0.018
Benzene	**0.553**	**0.550**	0.003
Acetaldehyde	**0.018**	**0.018**	0.0003
Naphthalene	**0.093**	**0.092**	0.001
1,3-Butadiene	0.00001	--	0.00001
Acrolein	**0.006**	**0.006**	0.00005
Toluene	**0.201**	**0.199**	0.002
Hexane	0.415	--	0.415
Phosphorus as P2O5	**0.810**	**0.770**	**0.040**
Phosphorus	**0.011**	**--**	**0.011**
Xylenes	**0.137**	**0.137**	**0.001**
Lead	**0.265**	**0.243**	**0.022**
Manganese	**1.159**	**1.142**	**0.018**
Mercury	**0.001**	**0.001**	**0.0002**
Nickel	**0.038**	**0.037**	**0.001**
Antimony	**0.015**	**0.015**	**0.000**
Arsenic	**0.184**	**0.159**	**0.025**
Beryllium	**0.004**	**0.003**	**0.000**
Cadmium	**0.025**	**0.025**	**0.000**
Chromium	**0.267**	**0.262**	**0.005**
Cobalt	**0.010**	**0.010**	**0.000**
Hydrochloric Acid	0.241	--	0.241
Selenium	0.004	0.003	0.001
Total HAPs	**4.53**	**3.73**	**0.80**

Table 3.6-11: Highest Modeled Air Pollutant Concentration Impacts from the Proposed Action at the Defined Sensitive Receptors

Pollutant	Averaging Time	Met Year	Receptor Location		Dispersion Modeling Results (µg/m^3)	Lowest Applicable Ambient Standard (µg/m^3)
			UTM Easting (m)	UTM Northing (m)		
Jarbidge Wilderness Area						
$PM_{2.5}$	24-Hour	**2010**	**634,545**	**4,608,201**	**0.0**	35
	Annual	**2010**	**632,947**	**4,608,167**	**0.0**	15
PM_{10}	24-Hour	**2010**	**628,352**	**4,608,069**	**0.1**	4
	Annual	1991	628,652	4,608,076	0.008	8
CO	1-Hour	**2010**	**627,543**	**4,610,542**	**0.8**	40,000
	8-Hour (< 5,000')	**2010**	**627,543**	**4,610,542**	**0.2**	10,000
	8-Hour (≥ 5,000')	**2010**	**627,543**	**4,610,542**	**0.2**	6,670

Pollutant	Averaging Time	Met Year	Receptor Location		Dispersion Modeling Results ($\mu g/m^3$)	Lowest Applicable Ambient Standard ($\mu g/m^3$)
			UTM Easting (m)	UTM Northing (m)		
Pb	1-Month	**2010**	**628,352**	**4,608,069**	**0.0000**	1.5
NO_2	1-Hour	**2010**	**632,347**	**4,608,154**	**0.4**	188
	Annual	**2010**	**628,321**	**4,608,164**	**0.0**	2.5
SO_2	1-Hour	**2010**	**630,150**	**4,608,108**	**0.1**	196
	3-Hour	**2010**	**627,540**	**4,610,936**	**0.1**	25
	24-Hour	1991	628,652	4,608,076	0.076	5
	Annual	1991	628,652	4,608,076	0.001	2
Great Basin National Park						
$PM_{2.5}$	24-Hour	**2010**	**732,016**	**4,327,169**	**7.0**	35
	Annual	**2010**	**732,114**	**4,327,174**	**2.4**	15
PM_{10}	24-Hour	**2010**	**732,213**	**4,327,179**	**10.3**	150
	Annual	1991	732,016	4,327,170	0.007	50
CO	1-Hour	**2010**	**732,213**	**4,327,179**	**2.6**	40,000
	8-Hour (< 5,000')	**2010**	**732,213**	**4,327,179**	**0.4**	10,000
	8-Hour (≥ 5,000')	**2010**	**732,213**	**4,327,179**	**0.4**	6,670
Pb	1-Month	**2010**	**731,031**	**4,327,122**	**0.000**	1.5
NO_2	1-Hour	**2010**	**732,016**	**4,327,169**	**0.8**	188
	Annual	**2010**	**732,016**	**4,327,169**	**0.0**	100
SO_2	1-Hour	**2010**	**731,622**	**4,327,150**	**0.1**	196
	3-Hour	**2010**	**732,311**	**4,327,183**	**0.1**	1,300
	24-Hour	1988	728,953	4,320,711	0.042	365
	Annual	1991	732,016	4,327,170	0.001	80
Bailey North Ranch*						
$PM_{2.5}$	**24-Hour**	**2010**	**580,043**	**4,419,188**	**7.3**	**35**
	Annual	**2010**	**580.043**	**4.419.188**	**2.45**	**15**
PM_{10}	**24-Hour**	**2010**	**580,043**	**4,419,188**	**12.0**	**150**
CO	**1-Hour**	**2010**	**580,043**	**4,419,188**	**37.9**	**40,000**
	8-Hour (<5,000')	**2010**	**580,043**	**4,419,188**	**6.9**	**10,000**
	8-Hour (>5,000')	**2010**	**580,043**	**4,419,188**	**6.9**	**6,670**
Pb	**1-Month**	**2010**	**580,043**	**4,419,188**	**0.000**	**1.5**

Pollutant	Averaging Time	Met Year	Receptor Location		Dispersion Modeling Results ($\mu g/m^3$)	Lowest Applicable Ambient Standard ($\mu g/m^3$)
			UTM Easting (m)	UTM Northing (m)		
NO_2	1-Hour	2010	580,043	4,419,188	18.3	188
	Annual	2010	580,043	4,419,188	0.3	100
SO_2	1-Hour	2010	580,043	4,419,188	1.6	196
	3-Hour	2010	580,043	4,419,188	1.0	1,300
Bailey South Ranch*						
$PM_{2.5}$	24-Hour	2010	581,599	4,396,519	7.4	35
	Annual	2010	581,599	4,396,519	2.45	15
PM_{10}	24-Hour	2010	581,599	4,396,519	12.3	150
CO	1-Hour	2010	581,599	4,396,519	37.5	40,000
	8-Hour (<5,000')	2010	581,599	4,396,519	7.2	10,000
	8-Hour (>5,000')	2010	581,599	4,396,519	7.2	6,670
Pb	1-Month	2010	581,599	4,396,519	0.0000	1.5
NO_2	1-Hour	2010	581,599	4,396,519	21.7	188
	Annual	2010	581,599	4,396,519	0.4	100
SO_2	1-Hour	2010	581,599	4,396,519	2.4	196
	3-Hour	2010	581,599	4,396,519	1.5	1,300
Benson Ranch*						
$PM_{2.5}$	24-Hour	2010	584,817	4,396,554	7.3	35
	Annual	2010	584,817	4,396,554	2.45	15
PM_{10}	24-Hour	2010	584,817	4,396,554	11.7	150
CO	1-Hour	2010	584,817	4,396,554	27.1	40,000
	8-Hour (<5,000')	2010	584,817	4,396,554	5.8	10,000
	8-Hour (>5,000')	2010	584,817	4,396,554	5.8	6,670
Pb	1-Month	2010	584,817	4,396,554	0.000	1.5
NO_2	1-Hour	2010	584,817	4,396,554	15.8	188
	Annual	2010	584,817	4,396,554	0.3	100
SO_2	1-Hour	2010	584,817	4,396,554	1.5	196
	3-Hour	2010	584,817	4,396,554	0.7	1,300
Eureka County High School						
$PM_{2.5}$	24-Hour	2010	588,204	4,374,062	7.2	35

Pollutant	Averaging Time	Met Year	Receptor Location		Dispersion Modeling Results ($\mu g/m^3$)	Lowest Applicable Ambient Standard ($\mu g/m^3$)
			UTM Easting (m)	UTM Northing (m)		
	Annual	**2010**	588,204	4,374,06**2**	**2.4**	15
PM_{10}	24-Hour	**2010**	588,204	4,374,06**2**	**10.8**	150
	Annual	**1990**	588,204	4,374,06**2**	**0.073**	50
CO	1-Hour	**2010**	588,204	4,374,06**2**	**11.2**	40,000
	8-Hour (< 5,000')	**2010**	588,204	4,374,06**2**	**1.9**	10,000
	8-Hour (≥ 5,000')	**2010**	588,204	4,374,06**2**	**1.9**	6,670
Pb	1-Month	**2010**	588,204	4,374,06**2**	**0.000**	1.5
NO_2	1-Hour	**2010**	588,204	4,374,06**2**	**6.3**	188
	Annual	**2010**	588,204	4,374,06**2**	**0.1**	100
SO_2	1-Hour	**2010**	588,204	4,374,06**2**	**1.0**	196
	3-Hour	**2010**	588,204	4,374,06**2**	**0.5**	1,300
	24-Hour	**1992**	588,204	4,374,06**2**	**0.216**	365
	Annual	**1990**	588,204	4,374,06**2**	**0.010**	80
Eureka Elementary School						
$PM_{2.5}$	24-Hour	**2010**	589,341	4,373,756	**7.2**	35
	Annual	**2010**	589,341	4,373,756	**2.4**	15
PM_{10}	24-Hour	**2010**	589,341	4,373,756	**10.9**	150
	Annual	**2010**	589,341	4,373,756	**0.075**	50
CO	1-Hour	**2010**	589,341	4,373,756	**9.2**	40,000
	8-Hour (< 5,000')	**2010**	589,341	4,373,756	**1.7**	10,000
	8-Hour (≥ 5,000')	**2010**	589,341	4,373,756	**1.7**	6,670
Pb	1-Month	**2010**	589,341	4,373,756	**0.000**	1.5
NO_2	1-Hour	**2010**	589,341	4,373,756	**6.6**	188
	Annual	**2010**	589,341	4,373,756	**0.1**	100
SO_2	1-Hour	**2010**	589,341	4,373,756	**0.7**	196
	3-Hour	**2010**	589,341	4,373,756	**0.4**	1,300
	24-Hour	**1992**	589,341	4,373,756	**0.174**	365
	Annual	**1990**	589,341	4,373,756	**0.010**	80
Eureka County Medical Clinic						
$PM_{2.5}$	24-Hour	**2010**	589,358	4,374,00**8**	**7.2**	35

Pollutant	Averaging Time	Met Year	Receptor Location		Dispersion Modeling Results ($\mu g/m^3$)	Lowest Applicable Ambient Standard ($\mu g/m^3$)
			UTM Easting (m)	UTM Northing (m)		
	Annual	**2010**	589,358	4,374,00**8**	**2.4**	15
PM_{10}	24-Hour	**2010**	589,358	4,374,00**8**	**10.9**	150
	Annual	1990	589,358	4,374,00**8**	**.076**	50
CO	1-Hour	**2010**	589,358	4,374,00**8**	**9.1**	40,000
	8-Hour (< 5,000')	**2010**	589,358	4,374,00**8**	**1.7**	10,000
	8-Hour (≥ 5,000')	**2010**	589,358	4,374,00**8**	**1.7**	6,670
Pb	1-Month	**2010**	589,358	4,374,00**8**	**0.000**	1.5
NO_2	1-Hour	**2010**	589,358	4,374,00**8**	**6.7**	188
	Annual	**2010**	589,358	4,374,00**8**	**0.1**	10
SO_2	1-Hour	**2010**	589,358	4,374,00**8**	**0.7**	196
	3-Hour	**2010**	589,358	4,**3**74,00**8**	**0.4**	1,300
	24-Hour	1991	589,358	4,**3**74,00**8**	**0.182**	365
	Annual	1990	589,358	4,**3**74,00**8**	**0.011**	80
Alpha Ranch						
$PM_{2.5}$	24-Hour	**2010**	568,465	4,428,941	**7.4**	35
	Annual	**2010**	568,465	4,428,941	**2.4**	15
PM_{10}	24-Hour	**2010**	568,465	4,428,941	**12.0**	150
	Annual	1991	568,465	4,428,941	**.110**	50
CO	1-Hour	**2010**	568,465	4,428,941	**44.8**	40,000
	8-Hour (< 5,000')	**2010**	568,465	4,428,941	**6.1**	10,000
	8-Hour (≥ 5,000')	**2010**	568,465	4,428,941	**6.1**	6,670
Pb	1-Month	**2010**	568,465	4,428,941	**0.000**	1.5
NO_2	1-Hour	**2010**	568,465	4,428,941	**21.1**	188
	Annual	**2010**	568,465	4,428,941	**0.2**	100
SO_2	1-Hour	**2010**	568,465	4,428,941	**2.4**	196
	3-Hour	**2010**	568,465	4,428,941	**1.2**	1,300
	24-Hour	1989	568,465	4,428,941	**0.445**	365
	Annual	1991	568,465	4,428,941	**0.013**	80
Roberts Creek Ranch						
$PM_{2.5}$	24-Hour	**2010**	560,933	4,400,379	**7.9**	35

Pollutant	Averaging Time	Met Year	Receptor Location		Dispersion Modeling Results ($\mu g/m^3$)	Lowest Applicable Ambient Standard ($\mu g/m^3$)
			UTM Easting (m)	UTM Northing (m)		
	Annual	**2010**	560,933	4,400,379	**2.5**	15
PM_{10}	24-Hour	**2010**	560,933	4,400,379	**14.3**	150
	Annual	1991	560,933	4,400,388	**1.091**	50
CO	1-Hour	**2010**	560,933	4,400,379	**60.9**	40,000
	8-Hour (< 5,000')	**2010**	560,933	4,400,379	**11.0**	10,000
	8-Hour (≥ 5,000')	**2010**	560,933	4,400,379	**1.0**	6,670
Pb	1-Month	**2010**	560,933	4,400,379	**0.000**	1.5
NO_2	1-Hour	**2010**	560,933	4,400,379	**37.1**	188
	Annual	**2010**	560,933	4,400,379	**0.5**	100
SO_2	1-Hour	**2010**	560,933	4,400,379	**3.9**	196
	3-Hour	**2010**	560,933	4,400,379	**1.7**	1,300
	24-Hour	1991	560,933	4,400,379	**0.942**	365
	Annual	1991	560,933	4,400,379	**0.112**	80
Tonkin Reservoir						
$PM_{2.5}$	24-Hour	**2010**	550,030	4,418,098	**7.5**	35
	Annual	**2010**	550,030	4,418,098	**2.4**	15
PM_{10}	24-Hour	**2010**	550,030	4,418,098	**12.3**	150
	Annual	1988	550,030	4,418,098	**0.236**	50
CO	1-Hour	**2010**	550,030	4,419,098	**28.4**	40,000
	8-Hour (< 5,000')	**2010**	550,030	4,419,098	**6.5**	10,000
	8-Hour (≥ 5,000')	**2010**	550,030	4,419,098	**6.5**	6,670
Pb	1-Month	**2010**	550,030	4,419,098	**0.000**	1.5
NO_2	1-Hour	**2010**	550,030	4,419,098	**14.8**	188
	Annual	**2010**	550,030	4,419,098	**0.2**	100
SO_2	1-Hour	**2010**	550,030	4,419,098	**1.9**	196
	3-Hour	**2010**	550,030	4,419,098	**1.1**	1,300
	24-Hour	1989	550,030	4,419,098	**0.443**	365
	Annual	1988	550,030	4,419,098	**0.031**	80

*** New Sensitive Receptors**
[1] All coordinates in UTM projection, North American Datum 1983.
[2] Background values, as listed in Table 3.6-7 are included.

- **Impact 3.6.3.3-3:** The modeled PM_{10}, $PM_{2.5}$, Pb, CO, NO_2, SO_2, and O_3 from the Proposed Action emissions show a very small increase in these pollutants at the sensitive receptors.

  Significance of the Impact: This impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.6.3.3.5 Climate Change Effects

The estimated fuel and electrical power consumption for the Proposed Action is provided in Table 3.6-12. In accordance with Nevada law, a portion of the electrical power consumed by EML would continue to come from renewable energy sources, increasing from 11 percent in 2009 to 15 percent in 2013 and thereafter (Nevada State Legislature 2008).

Table 3.6-12: Proposed Action and Alternatives Fuel and Power Consumption and Greenhouse Gas Emissions

Energy Source	Years	Alternatives				
		Proposed Action	Partial Backfill	Off-Site Transfer of Ore Concentrate for Processing	Slower, Longer Project Alternative[5]	No Action
Diesel Fuel Consumption (gallons per year)	1 - 32	10,000,000	10,000,000	10,000,000	5,000,000	11,000
	33 - 44	1,157,750	9,697,750	1,157,750	578,875	0
	45 - 48.4[1]	0	8,540,000	0	0	0
Propane Consumption (gallons per year)	1 - 32	1,218,100	1,218,100	505,100	609,050	0
	33 - 44	618,200	618,200	256,400	309,100	0
	45 - 48.4[1]	0	0	0	0	0
Electricity Consumption (megawatt-hours per year)	1 - 32	454,500	454,500	441,600	227,250	0
	33 - 44	444,200[2]	444,200[2]	437,800[3]	222,100	0
	45 - 48.4	17,520	17,520	17,520	8,760	0
Greenhouse Gas Emissions[4] (tons CO_2 per year)	1 - 32	604,251	604,251	586,069	302,125.5	124
	33 - 44	489,581	586,125	480,510	244,790.5	0
	45 - 48.4[1]	18,641	115,186	18,641	9,320.5	0

Source: EML 2009b.

1 - From year 32 to year 49 it would take approximately 16.4 years to complete the partial backfilling of the open pit under the Partial Backfill Alternative.

2 - Power requirements for the mill roaster, wells, and tailings (no electric shovels or drills are required for remining of the LGO Stockpile and waste rock dumps.

3 - Power requirements for the mill, concentrate leaching and drying, wells, and tailings (excludes to roaster)

4 - Emissions based on EPA AP-42 (EPA 2009) and Department of Energy (DOE) (DOE 2000) data.

5 - Although the lower mining and processing rates are inherently less fuel efficient, on a production unit basis, the precise energy consumption amounts cannot be determined without redesigning the mining fleet and processing facility. Therefore, for the purposes of this analysis, it is assumed that the Slower, Longer Project Alternative would consume half the energy for twice the duration relative to the Proposed Action.

Recent publications in the scientific literature suggest there is a direct correlation between global warming and emissions of GHG (IPCC 2007b). Other recent publications in the scientific literature suggest the correlation is not evident (Singer and Avery 2008; Spencer 2008; Soloman 2008). GHGs include CO_2, methane, NO_X, and O_3. GHGs also include water vapor, although a dominant GHG it is generally not considered in GHG calculations. Although many of

these gases occur naturally in the atmosphere, man-made sources substantially have increased the emissions of GHGs over the past several decades. Of the man-made GHGs, the greatest contribution currently comes from CO_2 emissions.

GHG emissions associated with the proposed Project primarily would be associated with the consumption of energy for mining and ore processing over the 44-year mine life. Operations that would contribute to GHG emissions would include the following:

- Fuel consumption (vehicles and machinery)**;**
- Electricity consumption (machinery, milling, heap leach water circulation, ground water pumping and dewatering)**; and**
- Diesel fuel combustion during the roasting of the ore concentrate (diesel is used as a flotation agent and may be carried through the process)**.**

The current national annual emissions of GHGs are approximately eight billion tons (EPA 2008b). Under the Proposed Action, the Project would emit up to approximately 604 thousand tpy of GHGs, or approximately 0.00755 percent of the national annual emissions.

Existing climate prediction models**, which use GHG emissions as input values** for the **analysis and** prediction of climate change**,** are global in nature; therefore, they are not at the appropriate scale to estimate potential impacts **on** climate change **as a result of** the Proposed Action.

3.6.3.3.6 Residual Effects

The residual effects of the Proposed Action include point source and fugitive PM_{10}, $PM_{2.5}$, and Pb emissions from vehicular traffic, blasting, and material handling and processing operations. Other impacts include combustion emissions of PM_{10}, $PM_{2.5}$, CO, NO_2, SO_2, and VOC generated by numerous processes as a result of the Proposed Action, including combustion emissions from diesel engines, and burning propane, fuel oil, or diesel in various process equipment**s**. These effects would cease once the Project ceases and there are no irreversible or irretrievable effects for the Proposed Action on air resources.

3.6.3.4 No Action Alternative

Under the No Action Alternative, air quality impacts associated with the Project would not occur. EMI would not be authorized to develop the Project and mine the ore body as described in the Proposed Action. However, the currently authorized exploration in the Project Area could continue, which would result in fugitive dust emissions and combustion emissions.

3.6.3.4.1 PM_{10}, $PM_{2.5}$, and Pb Emissions and Modeled Concentrations

The major sources of PM_{10}, $PM_{2.5}$, and Pb emissions from the No Action Alternative include resuspension of unpaved road dust from trucks and emissions from drill operations. Emission controls such as road watering would help minimize these emissions.

- **Impact 3.6.3.4-1:** Emissions of PM_{10}, $PM_{2.5}$, and Pb would be generated by the No Action Alternative in an amount substantially less than under the Proposed Action. The modeled PM_{10}, $PM_{2.5}$, and Pb concentrations under the Proposed Action support the

conclusion that these concentrations under the No Action Alternative would be below the NSAAQS and NAAQS, even with the addition of the background values.

Significance of the Impact: This impact is not considered significant.

No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.6.3.4.2 Combustion Emissions

Combustion of diesel in the trucks and drilling rigs can produce elevated ambient levels of CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and O_3. The amount of these emissions under the No Action Alternative would be substantially less than under the Proposed Action. Despite the lack of tailpipe emissions control technology for combustion sources throughout the Project Area, the maximum modeled CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and O_3 concentrations from both models for the Proposed Action would be well below either the NSAAQS or the NAAQS, and, therefore, the concentrations under the No Action alternative would also be less than the NSAAQS and the NAAQS.

- **Impact 3.6.3.4-2:** Combustion emissions of CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and VOC would be generated by the No Action Alternative in amounts that would be substantially less than under the Proposed Action. The modeled CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and O_3 concentrations under the Proposed Action support the conclusion that these concentrations under the No Action Alternative would be below the NSAAQS and NAAQS, even with the addition of the background values.

  Significance of the Impact: This impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.6.3.4.3 HAPs Emissions

The major sources of HAPs emissions from the No Action Alternative include resuspension of unpaved road dust, which contain HAP metals, from trucks and combustion emissions from drill operations. Emission controls such as road watering would help minimize these emissions.

3.6.3.4.4 Sensitive Receptors Effects

Dispersion modeling for the Proposed Action was also performed to determine the impacts on the "sensitive" receptors listed in Section 3.6.3.2.2 for the NEPA analysis. The highest 24-hour PM_{10} impact from the Proposed Action on the defined sensitive receptors was found to be **14.3** $\mu g/m^3$ at the Roberts Creek Ranch. The highest annual PM_{10} impact from the Proposed Action on the defined sensitive receptors was found to be 1.091 $\mu g/m^3$, also at the Roberts Creek Ranch; therefore, any potential impacts from the No Action Alternative would be less than those identified for the Proposed Action.

The NEPA modeling analysis was also performed for the Proposed Action to determine the impacts of the gaseous pollutants from the Proposed Action on the defined sensitive receptors,

including the Jarbidge Wilderness. In all instances, the concentrations are a small fraction of the ambient standards, and in the case of the Jarbidge Wilderness, much less than the PSD Class I increments; therefore, any potential impacts from the No Action Alternative would be less than those identified for the Proposed Action.

- **Impact 3.6.3.4-3:** The emissions of PM_{10}, $PM_{2.5}$, Pb, CO, NO_2, SO_2, and O_3 from the No Action Alternative emissions may show a very small increase in these pollutants at the sensitive receptors and any potential impacts would be less than those under the Proposed Action.

  Significance of the Impact: This impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.6.3.4.5 Climate Change Effects

The estimated fuel and electrical power consumption for the No Action Alternative is provided in Table 3.6-11. GHG emissions associated with the No Action Alternative primarily would be associated with the consumption of fuel (vehicles and machinery). The current national annual emissions of GHGs are approximately eight billion tons (EPA 2008b). Under the No Action Alternative, the Project would emit up to approximately 124 tpy of GHGs, or approximately 0.000001 percent of the national annual emissions.

Existing climate prediction models**, which use GHG emissions as input values** for the **analysis and** prediction of climate change**,** are global in nature; therefore, they are not at the appropriate scale to estimate potential impacts **on** climate change **as a result of** the No Action Alternative.

3.6.3.4.6 Residual Effects

The residual effects of the No Action Alternative include point source and fugitive PM_{10}, $PM_{2.5}$, and Pb emissions from vehicular traffic and drilling operations. Other impacts include combustion emissions of PM_{10}, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and VOC generated by vehicles and drill rigs as a result of the No Action Alternative, including combustion emissions from diesel and gasoline engines. These effects would cease once the activities under the No Action Alternative ceases and there are no irreversible or irretrievable effect**s** for the No Action Alternative on air resources. The potential impacts would be adverse, but not irreversible.

3.6.3.5 Partial Backfill Alternative

The Partial Backfill Alternative would be the same as the Proposed Action, except that at the end of the mining in the open pit, the open pit would be partially backfilled to eliminate the potential for a pit lake. Backfilling would begin in Year 32 with an approximately 17-year time frame to complete the partial backfill process. The backfilling would be completed using 1.3 billion tons of Non-PAG waste rock from the Non-PAG WRDF. Emissions related to the backfilling process would be essentially the same as those from the mining process. A quantitative analysis was not completed because the modeling analysis for the Proposed Action, which looked at time periods from one hour to annual, sufficiently encompasses the potential impacts of the Partial Backfill

Alternative. The air quality impacts would occur over a longer period of time as compared to the Proposed Action.

3.6.3.5.1 PM_{10}, $PM_{2.5}$, and Pb Emissions

Activities under the Partial Backfill Alternative would be the same as under the Proposed Action through the completion of the mining operation. Therefore, the analysis of the potential air quality impacts for the Proposed Action appropriately characterize the potential air quality impacts for the Partial Backfill Alternative. In Year 32 of the mine life, backfilling would begin under the Partial Backfill Alternative, and approximately 1.3 billion tons of waste rock deposited at the Non-PAG WDRF would be transferred to the open pit to complete the partial backfilling of the waste rock mined under this alternative. The emissions associated with this activity are fugitive dust and combustion emissions associated with the loader transport and dumping of the waste rock. These emissions are a subset of the type and location of emissions evaluated for the placement of the waste rock under the analysis for the Proposed Action. Since the Proposed Action did not result in an identified exceedance of the NAAQS, activities under this portion of the Partial Backfill Alternative are also not expected to result in an exceedance of the NAAQS.

The $PM_{10}/PM_{2.5}$ emissions from the bus transportation of the employees on public roads to and from the Project Area would be similar to those of the Proposed Action, on an annual basis. However, the emissions would occur over a longer time period, due to the backfilling of the open pit. These emissions would have an incremental impact on the air quality in the vicinity of the transportation route.

The potential for indirect fugitive dust emissions from the ground water production in Kobeh Valley would be essentially the same as under the Proposed Action. These emissions would have an incremental impact on the air quality in the vicinity of the Kobeh Valley.

- **Impact 3.6.3.5-1:** The emissions of PM_{10}, $PM_{2.5}$, and Pb would be generated by numerous processes as a result of the Partial Backfill Alternative, including the resuspension of road dust, wind erosion of exposed dirt surfaces, and activities related to the processing of ore materials. These activities are inherent to the mining process and would be ongoing throughout the life of the Partial Backfill Alternative. Since this alternative is essentially the same as the Proposed Action, just longer in duration, the PM_{10}, $PM_{2.5}$, and Pb concentrations would be below the NSAAQS and NAAQS, even with the addition of the background values.

  Significance of the Impact: This impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.6.3.5.2 Combustion Emissions

Combustion of diesel in the haul trucks and mobile equipment, such as loaders, dozers, etc., the combustion of propane in processing units such as boilers, and the combustion of fuel oil or diesel in units such as the roaster, can produce elevated ambient levels of CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and O_3 (from VOC emissions). In most cases, combustion emissions are generally uncontrolled for the emissions units. Despite the lack of tailpipe emissions control technology for

combustion sources throughout the Project Area, the maximum modeled CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and O_3 concentrations from both models are well below either the NSAAQS or the NAAQS. The modeled results, including background concentrations, for each pollutant for each applicable averaging time are shown in Table 3.6-9.

The CO, NO_2, SO_2, and VOC emissions from the bus transportation of the employees on public roads would be similar to those of the Proposed Action, on an annual basis. However, the emissions would occur over a longer time period, due to the backfilling of the open pit. These emissions would be from engine exhaust. These emissions would have an incremental impact on the air quality in the vicinity of the transportation route.

- **Impact 3.6.3.5-2:** Combustion emissions of CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and VOC would be generated by numerous processes as a result of the Partial Backfill Alternative, including combustion emissions from diesel engines and burning propane, fuel oil, or diesel in various process equipment. These emissions would be essentially the same as under the Proposed Action, except longer in duration. Therefore, the CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and O_3 concentrations would be below the NSAAQS and NAAQS.

  Significance of the Impact: This impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.6.3.5.3 HAPs Emissions

HAPs emission rates from this alternative would be essentially the same as under the Proposed Action, on an annual basis. These emissions would result from the handling of earthen materials, the combustion of the hydrocarbon fuels, and the handling and use of various chemicals. However, the emissions would occur over a longer time period, due to the backfilling of the open pit. With the exception of Pb, there are no ambient air quality standards for HAPs and these emissions would have an incremental impact on the air quality in the vicinity of the Project Area. Pb is a criteria pollutant, as mentioned previously in the text.

3.6.3.5.4 Sensitive Receptors Impacts

Since the Partial Backfill Alternative is essentially the same as the Proposed Action, just longer in duration, the dispersion modeling that was performed for the Proposed Action to determine the impacts on the "sensitive" receptors listed in Section 3.6.3.2.2 is also representative of the Partial Backfill Alternative.

This same NEPA modeling analysis for the Proposed Action was performed to determine the impacts of the gaseous pollutants from the Project on the defined sensitive receptors, including the Jarbidge Wilderness, for each applicable averaging time shown in Table 3.6-10, and is representative of the Partial Backfill Alternative. In all instances, the concentrations are a small fraction of the ambient standards and, in the case of the Jarbidge Wilderness, are much less than the PSD Class I increments.

- **Impact 3.6.3.5-3:** The PM_{10}, $PM_{2.5}$, Pb, CO, NO_2, SO_2, and O_3 concentrations from the Partial Backfill Alternative would show a very small increase in these pollutants at the sensitive receptors.

  Significance of the Impact: This impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.6.3.5.5 Climate Change Effects

The estimated fuel and electrical power consumption for the Partial Backfill Alternative is provided in Table 3.6-11. GHG emissions associated with the Partial Backfill Alternative primarily would be associated with the consumption of fuel (vehicles and machinery) and electricity. The current national annual emissions of GHGs are approximately eight billion tons (EPA 2008b). Under the Partial Backfill Alternative, the Project would emit up to approximately 604 thousand tpy of GHGs, or approximately 0.00755 percent of the national annual emissions.

Existing climate prediction models**, which use GHG emissions as inputs** for the **analysis and** prediction of climate change**,** are global in nature; therefore, they are not at the appropriate scale to estimate potential impacts **on** climate change **as a result of** the Partial Backfill Alternative.

3.6.3.5.6 Residual Effects

The residual adverse impacts of the Partial Backfill Alternative include fugitive PM_{10}, $PM_{2.5}$, and Pb emissions from vehicular traffic, blasting, and material handling and processing operations. Other impacts include combustion emissions of PM_{10}, $PM_{2.5}$, CO, NO_2, SO_2, and VOC generated by numerous processes as a result of the Partial Backfill Alternative, including combustion emissions from diesel engines and burning propane, fuel oil, or coal in various process equipment**s**. These impacts would be adverse, but not irreversible.

3.6.3.6 Off-Site Transfer of Ore Concentrate for Processing Alternative

Activities under the Off-Site Transfer of Ore Concentrate for Processing Alternative would be the same as the Proposed Action; however the ore processing facility would include only the milling operations of the molybdenum sulfide concentrate. The technical grade Mo oxide and FeMo portions of the processing facility would not be constructed. In addition, the leaching of the concentrate would likely not be done on site and the Mo sulfide would be shipped off site for processing. A quantitative analysis was not completed because the analysis for the Proposed Action sufficiently encompasses the potential impacts of the Off-Site Transfer of Ore Concentrate for Processing Alternative.

3.6.3.6.1 PM_{10}, $PM_{2.5}$, and Pb Emissions

Activities under the Off-Site Transfer of Ore Concentrate for Processing Alternative would be the same as under the Proposed Action through the completion of the mining and milling operations, less the roaster and FeMo operations. The off-site transfer of the ore concentrate would still result in air quality impacts, but the roaster and FeMo operation impacts would occur at a different site. Therefore, the emissions in the Project Area under this alternative would be

reduced as compared to the Proposed Action. The roaster and FeMo operations emissions are a substantial portion of the "NEPA – Point and Process Fugitive Sources" emissions outlined in Table 3.6-3. Since the Proposed Action would not result in an identified exceedance of the NAAQS, activities under this portion of the Off-Site Transfer of Ore Concentrate for Processing Alternative would also not be expected to result in an exceedance of the NAAQS.

The $PM_{10}/PM_{2.5}$ emissions from the bus transportation of the employees on public roads to and from the Project Area would be similar, but perhaps slightly less, to those of the Proposed Action, on an annual basis, due to fewer employees. These emissions would have an incremental impact on the air quality in the vicinity of the transportation route.

The potential for indirect fugitive dust emission from the ground water production in Kobeh Valley would be essentially the same as under the Proposed Action. These emissions would have an incremental impact on the air quality in the vicinity of the Kobeh Valley.

- **Impact 3.6.3.6-1:** Emissions of PM_{10}, $PM_{2.5}$, and Pb would be generated by numerous processes as a result of the Off-Site Transfer of Ore Concentrate for Processing Alternative, including the resuspension of road dust, wind erosion of exposed dirt surfaces, and activities related to the processing of ore materials. These activities are inherent to the mining process and would be ongoing throughout the life of the Project. The PM_{10}, $PM_{2.5}$, and Pb concentrations would be below the NSAAQS and NAAQS, even with the addition of the background values.

  Significance of the Impact: This impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.6.3.6.2 Combustion Emissions

Activities under the Off-Site Transfer of Ore Concentrate for Processing Alternative would be the same as under the Proposed Action through the completion of the mining operation less the roasting and FeMo operations. The off-site transfer of the ore concentrate would still result in air quality impacts for roasting and FeMo operations, but these impacts would occur at a different site. Therefore, the emissions in the Project Area would be reduced and would be accounted for at the undetermined alternative processing location. These emissions are a subset of the type and location of emissions evaluated for the Proposed Action. Since the Proposed Action would not result in an identified exceedance of the NAAQS, activities under this portion of the Off-Site Transfer of Ore Concentrate for Processing Alternative would also not be expected to result in an exceedance of the NAAQS.

Combustion of diesel in the haul trucks and mobile equipment, such as loaders, dozers, etc., the haul of concentrate to an off-site processing facility, and the combustion of propane in processing units such as the boilers, can produce elevated ambient levels of CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and O_3. In most cases, combustion emissions are generally uncontrolled for the emissions units. Despite the lack of tailpipe emissions control technology for combustion sources throughout the Project Area, the maximum CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and O_3 concentrations would be below either the NSAAQS or the NAAQS. These emissions would be greater than under the Proposed Action, due to the off-site transfer of ore concentrate. However, there would

be a corresponding reduction in emissions due to the elimination in the roaster process under this alternative. The emissions from the off-site transfer of ore concentrate have not been quantified because the potential location for the transfer is not reasonably known.

The CO, NO_2, SO_2, and VOC emissions from the bus transportation of the employees on public roads would be similar, but perhaps slightly less, to those of the Proposed Action, on an annual basis, due to fewer employees. These emissions would be from engine exhaust. These emissions would have an incremental impact on the air quality in the vicinity of the transportation route.

- **Impact 3.6.3.6-2:** Combustion emissions of CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and VOC would be generated by numerous processes as a result of the Off-Site Transfer of Ore Concentrate for Processing Alternative, including combustion emissions from diesel engines, and burning propane, fuel oil, or diesel in various process equipment**s**. The CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and O_3 concentrations would be below the NSAAQS and NAAQS.

  Significance of the Impact: This impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.6.3.6.3 HAPs Emissions

HAPs emission rates from this alternative would be less than under the Proposed Action, on an annual basis because the roasting of the ore would not occur. These emissions would result from the handling of earthen materials, the combustion of the hydrocarbon fuels, and the handling and use of various chemicals. With the exception of Pb, there are no ambient air quality standards for HAPs and these emissions would have an incremental impact on the air quality in the vicinity of the Project Area. Pb is a criteria pollutant, as mentioned previously in the text.

3.6.3.6.4 Sensitive Receptors Impacts

Since the Off-Site Transfer of Ore Concentrate for Processing Alternative is essentially the same as the Proposed Action, just with lower emissions at the Project site only, the dispersion modeling that was performed for the Proposed Action to determine the impacts on the "sensitive" receptors listed in Section 3.6.3.2.2 is representative of the Off-Site Transfer of Ore Concentrate for Processing Alternative.

This same NEPA modeling analysis for the Proposed Action was performed to determine the impacts of the gaseous pollutants from the Project on the defined sensitive receptors, including the Jarbidge Wilderness, for each applicable averaging time shown in Table 3.6-10 and is representative of the Off-Site Transfer of Ore Concentrate for Processing Alternative. In all instances, the concentrations are a small fraction of the ambient standards, and in the case of the Jarbidge Wilderness, are much less than the PSD Class I increments.

- **Impact 3.6.3.6-3:** The PM_{10}, $PM_{2.5}$, Pb, CO, NO_2, SO_2, and VOC concentrations from the Off-Site Transfer of Ore Concentrate for Processing Alternative would show a very small increase in these pollutants at the sensitive receptors.

Significance of the Impact: This impact is not considered significant.

No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.6.3.6.5 Climate Change Effects

The estimated fuel and electrical power consumption for the Off-Site Transfer of Ore Concentrate for Processing Alternative is provided in Table 3.6-11. GHG emissions associated with the Off-Site Transfer of Ore Concentrate for Processing Alternative primarily would be associated with the consumption of fuel (vehicles and machinery) and electricity. The current national annual emissions of GHGs are approximately eight billion tons (EPA 2008b). Under the Off-Site Transfer of Ore Concentrate for Processing Alternative, the Project would emit up to approximately 586,069 tpy of GHGs, or approximately 0.0073 percent of the national annual emissions. These emissions would be greater than under the Proposed Action, due to the off-site transfer of ore concentrate. However, there would be a corresponding reduction in emissions due to the elimination in the roaster process under this alternative. The emissions from the off-site transfer of ore concentrate have not been quantified because the potential location for the transfer is not reasonably known.

Existing climate prediction models**, which use GHG emissions as inputs** for the **analysis and** prediction of climate change**,** are global in nature; therefore, they are not at the appropriate scale to estimate potential impacts **on** climate change **as a result of** the Off-Site Transfer of Ore Concentrate for Processing Alternative.

3.6.3.6.6 Residual Effects

The residual adverse impacts of the Off-Site Transfer of Ore Concentrate for Processing Alternative include fugitive PM_{10} and Pb emissions from vehicular traffic, blasting, and material handling on-site. Other impacts include combustion emissions of PM_{10}, $PM_{2.5}$, CO, NO_2, SO_2, and VOC generated by numerous processes as a result of the Off-Site Transfer of Ore Concentrate for Processing Alternative, including mostly combustion emissions from loading and hauling. These impacts would be adverse, but not irreversible.

3.6.3.7 Slower, Longer Project Alternative

Under the Slower, Longer Project Alternative, the Project would operate at approximately one-half the production rate as described in the Proposed Action, which would result in a project that would last approximately twice as long as the Proposed Action. Under this half-production rate alternative, the currently planned 96,000,000 st/y mining rate would be reduced to 48,000,000 st/y and the mill throughput would be reduced from 60,500 st/d of ore to 30,250 st/d.

The air dispersion model for the Project includes the parameters for the optimal design capacity of the equipment specified under the Proposed Action. The Proposed Action includes specific equipment for mining and milling and the operation of this equipment for 24 hours per day seven days per week at optimized throughput rates. Under the Slower, Longer Project Alternative, the mining and milling operation rates would be less than the Proposed Action. Therefore, the equipment that has been designed for the mining and milling under the Proposed Action could not be used and different equipment would need to be purchased.

A half-production Project has not been designed; however, for the sake of comparison, there are several facets of a half-production rate project that could be anticipated. Mining and processing equipment would be smaller, as would ancillary facilities (powerline supply and well field for example). The decreased size (and quantity) of mining and processing facilities and equipment would have decreased operational capacity, resulting in decreased emissions per time period (for example, per day, month or year). However, even though production would be half of the Proposed Action, it is expected that the emission reduction compared to the Proposed Action would be less than half (on a per-day or per-year basis). As a result, the Slower, Longer Project Alternative would create more emissions per ton processed than the Proposed Action. The smaller equipment that would be purchased may produce fewer emission (per day or year) than the larger equipment in the Proposed Action; however, work vehicles and smaller equipment types often tend to be less efficient and may therefore emit more per gallon or unit of energy output than larger models. Therefore, over the life of the Project under this alternative the total emissions would be greater than under the Proposed Action. Further, cutting the production in half does not cut the workforce traveling to the site in half (see Section 3.17.3 for further discussion). Rather, it is estimated that this Alternative would reduce the workforce by 30 percent compared to the Proposed Action. As a result, emissions from employee and contractor transportation to and from the Project Area would be decreased but not in proportion to the reduced production rate. Reagent consumption would be the same on a per-unit (of production) basis, but the smaller consumption rate would decrease storage requirements and material shipments.

3.6.3.7.1 PM_{10}, $PM_{2.5}$, and Pb Emissions

Since the Proposed Action did not result in an identified exceedance of the NAAQS, activities under the Slower, Longer Project Alternative would be smaller in magnitude and would therefore also not be expected to result in an exceedance of the NAAQS.

- **Impact 3.6.3.7-1:** The emissions of PM_{10}, $PM_{2.5}$, and Pb would be generated by essentially identical processes as discussed under the Proposed Action. However, the concentrations of these pollutants would be lower than modeled for the Proposed Action due to the halved production rate and decreased operating thresholds of smaller equipment and facilities. The resulting concentrations of PM_{10}, $PM_{2.5}$, and Pb would be lower than the Proposed Action which are below the NSAAQS and NAAQS.

  Significance of the Impact: This impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.6.3.7.2 Combustion Emissions

The CO, NO_2, SO_2, and VOC emissions (and resulting O_3 formed by NO_x and VOC emissions) from the bus transportation of the employees on public roads would be similar to those of the Proposed Action, on an annual basis. However, the emissions would occur over a longer time period, due to the mine life being extended to approximately 88 years. These emissions would be from engine exhaust. These emissions would have an incremental impact on the air quality in the vicinity of the transportation route.

- **Impact 3.6.3.7-2:** Combustion emissions of CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and VOC (and resultant O_3 concentrations) would be generated by numerous processes as a result of the Slower, Longer Project Alternative, including combustion emissions from diesel engines and burning propane, fuel oil, or diesel in various process equipment. These emissions would be lower than the Proposed Action when examined on a daily, monthly or annual basis (according to the exposure time period the air quality standards are associated with). Therefore, the CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and O_3 concentrations would be below the NSAAQS and NAAQS.

  Significance of the Impact: This impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.6.3.7.3 HAPs Emissions

HAPs emission rates from this alternative would be lower than as described under the Proposed Action. These emissions would result from the handling of earthen materials, the combustion of the hydrocarbon fuels, and the handling and use of various chemicals. However, the emissions per time period would be reduced and would occur over a longer time period. Although regulated by the EPA, with the exception of Pb, there are no ambient air quality standards for HAPs and these emissions would have a more dispersed incremental impact on the air quality in the vicinity of the Project Area than under the Proposed Action.

3.6.3.7.4 Sensitive Receptors Impacts

Since the Slower, Longer Project Alternative is essentially the same as the Proposed Action, just decreased operational rates and longer in duration, the dispersion modeling that was performed for the Proposed Action to determine the impacts on the "sensitive" receptors listed in Section 3.6.3.2.2 is a conservative representation of the Slower, Longer Project Alternative.

- **Impact 3.6.3.7-3:** The PM_{10}, $PM_{2.5}$, Pb, CO, NO_2, SO_2, and O_3 concentrations from the Slower, Longer Project Alternative would show a decrease in these pollutants at the sensitive receptors.

  Significance of the Impact: This impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.6.3.7.5 Climate Change Effects

Power consumption and **GHG** emissions have not been calculated for the Slower, Longer Project Alternative. However, the usage of these energy sources and GHG emissions have been calculated for the Proposed Action, which is provided in Table 3.6-12. GHG emissions associated with the Slower, Longer Project Alternative would be similar, and possibly slightly greater than those under the Proposed Action over the life of the Project. However, hourly or daily emission rates would be lower due to the decreased scale of operations, although the duration would be doubled.

Existing climate prediction models**, which use GHG emissions as inputs** for the **analysis and** prediction of climate change**,** are global in nature; therefore, they are not at the appropriate scale to estimate potential impacts **on** climate change **from** the Slower, Longer Project Alternative.

3.6.3.7.6 Residual Effects

The residual adverse impacts of the Slower, Longer Project Alternative include fugitive PM_{10}, $PM_{2.5}$, and Pb emissions from vehicular traffic, blasting, and material handling and processing operations. Other impacts include combustion emissions of PM_{10}, $PM_{2.5}$,CO, NO_2, SO_2, and VOC (and resulting O_3 formation) generated by numerous processes as a result of the Slower, Longer Project Alternative, including combustion emissions from diesel engines and burning propane, fuel oil, or coal in various process equipment. These impacts would be less than under the Proposed Action.

3.7 Visual Resources

3.7.1 Regulatory Framework

Scenic quality is a measure of the visual appeal of a parcel of land. Section 102(a)(8) of FLPMA placed an emphasis on the protection of the quality of scenic resources on public lands. Section 101(b) of the NEPA of 1969 required that measures be taken to ensure that aesthetically pleasing surroundings be retained for all Americans.

To ensure that these objectives are met, the BLM devised the VRM System. The VRM system provides a means to identify visual values, establish objectives for managing these values, and provide information to evaluate the visual effects of proposed projects. The inventory of visual values combines evaluations of scenic quality, sensitivity levels, and distance zones to establish visual resource inventory classes, which are "informational in nature and provide the basis for considering visual values in the land use planning process. They do not establish management direction and should not be used as a basis for constraining or limiting surface disturbing activities" (BLM 1986b).

VRM classes are typically assigned to public land units through the use of the visual resource inventory classes in the BLM's land use planning process. One of four VRM classes is assigned to each unit of public lands. The specific objectives of each VRM class are presented in Table 3.7-1.

Although there is a dark-sky movement whose goal is to reduce light pollution, there are no federal or State of Nevada regulations that regulate dark skies.

3.7.2 Affected Environment

3.7.2.1 Study Methods

Visual resources are characterized according to guidelines given in the Visual Resource Inventory Manual (BLM 1986b). The three primary components of the VRM system are scenic quality, visual sensitivity, and visual distance zones. Based on these three factors, land is placed into one of four visual resource inventory classes. The inventory classes rank the relative value of the visual resources and provide the basis for considering visual values in the RMP process.

The study area for visual resources is defined as the viewshed of the Project, or the area from which the Project can be seen (Figure 3.7.1). The viewshed includes parts of the Cortez Mountains and Simpson Park Range to the west, Toquima Range, Antelope Valley to the south, Diamond Mountains and a portion of the Ruby Mountains to the northeast, and an area south of Carlin to the north. Within this viewshed are large areas from which Mount Hope is not visible due to topography.

Table 3.7-1: BLM Visual Resource Management Classes

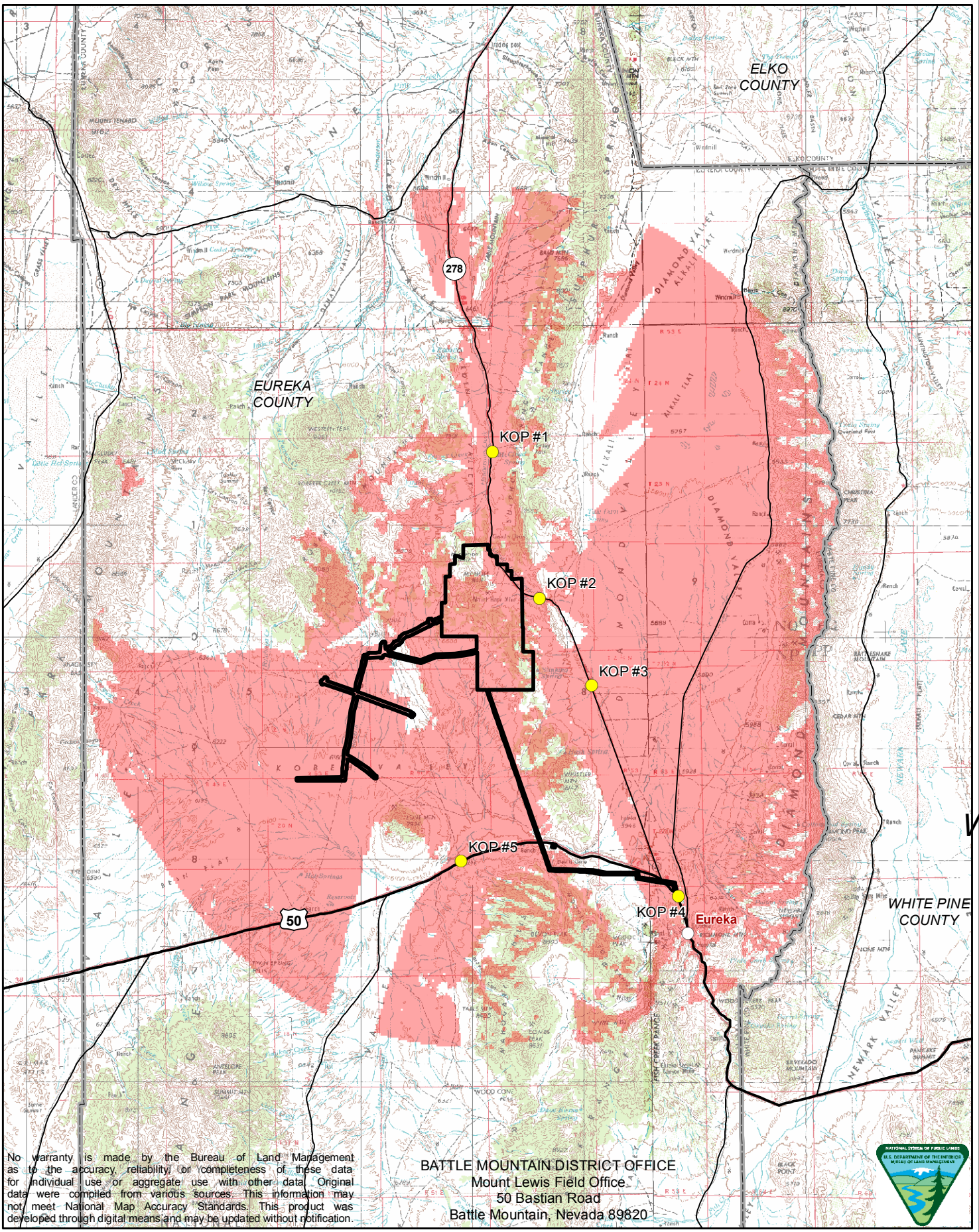
Class	Description
I	The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
II	The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any change must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
III	The objective of this class is to partially retain the existing character of the landscape. The level of change to the character should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
IV	The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. Management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Source: BLM 1986b

3.7.2.2 Existing Conditions

The study area lies in the Great Basin Section of the Basin and Range Province of the US. The Great Basin Section is characterized by wide, flat to gently sloping basins bounded by isolated mountain ranges. These mountain ranges rise from 3,000 to 5,000 feet above the basins. While most of the mountain ranges tend to be elongated in a northeast direction, the proposed Project lies on the southeast flank of a conical mountain called Mount Hope. Mount Hope has an elevation of 8,411 feet amsl and is located between the Roberts Mountains to the northwest and the Whistler Range to the southeast. Mount Hope is located 1.5 miles west of SR 278 at Garden Pass approximately 23 miles north of the Town of Eureka, Nevada. The Project is located in an area that has been explored, prospected, and mined historically. Both historic and recent operations are visible on Mount Hope and include waste rock dumps, roads, drill pads and buildings.

Vegetation on Mount Hope is typical of the surrounding mountain ranges and consists of areas of piñon-juniper in the higher elevations and sagebrush in the lower elevations. Previous mining and exploration activities have occurred in the higher elevations and are visibly evident because the light colored cleared areas contrast with the darker piñon-juniper stands and darker weathered rock formations.



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

BATTLE MOUNTAIN DISTRICT OFFICE
Mount Lewis Field Office
50 Bastian Road
Battle Mountain, Nevada 89820

EXPLANATION

- Project Boundary
- Key Observation Points
- Viewshed

N

0 5 10 Miles

DESIGN:	EMLLC	DRAWN:	CVD/GSL	REVIEWED:	RFD
CHECKED:	-	APPROVED:	RFD	DATE:	07/31/2012

FILE NAME: p1635_Fig3-7-1_KOP&Viewshed.mxd

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Top of Mount Hope Viewshed and Key Observation Points

Figure 3.7.1

The Mount Hope area was inventoried by the BLM for the Shoshone-Eureka Resource Management Plan as a combination of Visual Management Class **II,** III**,** and IV areas (BLM 1986a). **The visual classes in the vicinity of the Project Area are illustrated on Figure 3.7.2.** The BLM has mapped Class **II,** III**,** and Class IV **areas** at Mount Hope and the surrounding area. The Class III area includes the northeastern portion of Mount Hope as well as the area around SR 278 from Garden Pass to Diamond Valley. **The Class II area is located in a portion of the Project's powerline within the existing Falcon-Gondor corridor.** The remainder of the Project Area is in Class IV. Class IV is the least restrictive of the four management classes. A management activity in this class could draw attention as a dominant feature in the landscape, but attempts should be made to minimize the contrast by repeating the form, line, color, and texture of the characteristic landscape (BLM 1986a). In a Class III area the objective is to partially retain the existing character of the landscape. The level of change to the character should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Light pollution in the Mount Hope area is minimal and primarily limited to dispersed pinpoints of light associated with ranches. The Town of Eureka, 23 miles south of the Project Area, is the largest source of light pollution in the immediate area.

3.7.3 Environmental Consequences and Mitigation Measures

3.7.3.1 Significance Criteria

The assessment of visual impacts is based upon impact criteria and methodology described in the BLM Visual Contrast Rating System (BLM Manual Handbook, Section 8431-1). Effects to visual resources are assessed for the construction, operation, and closure of the Proposed Action and the alternatives. Quality of the visual environment is defined by the BLM VRM classes. Two issues, as follows, are addressed in determining impacts: a) the type and extent of actual physical contrast resulting from the Proposed Action and the alternatives, and b) the level of visibility of a facility, activity, or structure. These impacts would be considered significant if visual contrasts that result from landscape modifications are inconsistent with the changes allowed under the BLM VRM classification.

The extent to which the Proposed Action and the alternatives would affect the visual quality of the viewshed depends upon the amount of visual contrast created between the proposed facilities and the existing landscape elements (form, line, color, and texture) and features (land and water surface, vegetation, and structures). The magnitude of change relates to the contrast between each of the basic landscape elements and each of the features. Assessing the Proposed Action's or an alternative's contrast in this manner indicates the potential impacts and guides the development of mitigation measures that fulfill the VRM objectives.

3.7.3.2 Assessment Methodology

As discussed in Section 3.7.1, the BLM prescribes VRM classes for all BLM administered lands, including the area of the Proposed Action and alternatives. The visual effects of the facilities and operations of the Proposed Action were evaluated with respect to conformance with the established VRM Classes (**II,** III**,** and IV). The analysis was initiated through a Geographic Information System (GIS) viewshed analysis using a 25-mile radius of Mount Hope. Based on

this viewshed analysis and BLM and Eureka County input concerning Project visibility, five key observation points (KOPs) were chosen from routinely accessible vantage points from which the Project facilities may be visible. The viewshed and KOPs for the Project are shown on Figure 3.7.1.

The process used to assess visual impacts is the BLM Contrast Rating Process, as outlined in BLM Technical Manual 8432, "Visual Contrast Rating." This is a systematic process that is used to identify, describe and analyze potential visual impacts of proposed projects and activities. VRM Form 8400-4 was prepared for each KOP. This process consists of first separating the existing landscape into major features, which include land/water, vegetation and structures. Then the landscape character elements, which include form, line, color and texture, are described for each feature. As is common throughout the Great Basin Physiographic region, views are open and expansive. Potentially sensitive viewing locations (places where people travel, recreate, or reside) were examined and from these, five KOPs were identified and evaluated. The VRM process was then conducted for the Project. The degree of contrast between the features and elements of the existing landscape and post-development landscape was then determined. The Visual Management Class for the Mount Hope area **are** either Class IV, where there can be strong contrasts between the existing landscape and post-development landscape, Class III, where there can be moderate contrast between the existing landscape and post-development landscape that does not dominate the view**, or Class II, where the level of change to the characteristic landscape should be very low and must not attract attention.** Contrast rating sheets that represent the No Action Alternative were prepared to analyze the Proposed Action and the alternatives. Photosimulations were then prepared that show maximum build out (Year 32 for KOPs 1 through 4 and Year 44 for KOP 5) fully reclaimed and the Partial Backfill Alternative fully reclaimed. The following sections describe these scenarios. For KOP #2 a Year 20 scenario was also developed to inform local residents and interested parties of the anticipated view at Year 20 (approximately half of the expected mine life) of the 44-year active Project.

3.7.3.2.1 KOP #1 - Nevada SR 278 Southbound

KOP #1 is located on SR 278 approximately six miles north of the Project Area. This KOP is located at the point where the Project Area is in the observers line-of-sight for an extended period of time when driving south on SR 278. Figures 3.7.**3** a, b, c, and d show the following: 1) the view of existing conditions (No Action Alternative) (Figure 3.7.**3**a); 2) a photosimulation of maximum build out at Year 32 (Figure 3.7.**3**b); 3) a photosimulation of the fully reclaimed Project (Figure 3.7.**3**c); and 4) a photosimulation of the Partial Backfill Alternative at final reclamation (Figure 3.7.**3**d).

Figure 3.7.**3**a is a photograph of the current conditions. The landscape consists of navy blue and mauve colored pyramidal shaped hills in the background with a predominantly tan, brown, and sage green colored flat foreground. There are bold diagonal lines in the background and moderate horizontal lines in the foreground. The most prominent structure visible is the existing road in the foreground that is a diagonal feature against the more prominent horizontal lines of the landscape. The road leads the southbound observer's eyes to Mount Hope.

Figure 3.7.**3**b is a photosimulation showing maximum build out at Year 32. The landscape consists of a dark blue and mauve colored flat dome feature with light colored material on the top that represents the active WRDF. Mount Hope is a small pyramidal shape. The foreground is predominantly tan, brown, and sage green colored flat. There are bold primarily horizontal lines

PAG WRDF

T23N R48E | T23N R49E | T23N R50E | T23N R51E | T23N R52E | T23N R53E | T23N R54E

T22N R48E | T22N R49E | T22N R50E | T22N R51E | T22N R52E | T22N R53E | T22N R54E

T212N R51E | T212N R52E | T212N R53E | T212N R54E

T21N R48E | T21N R49E | T21N R50E | T21N R51E | T21N R52E | T21N R53E | T21N R54E

T20N R48E | T20N R49E | T20N R50E | T20N R51E | T20N R52E | T20N R53E | T20N R54E

T19N R50E | T19N R51E | T19N R52E | T19N R53E | T19N R54E

DIAMOND VALLEY | KOBE VALLEY | NITTO VALLEY FLAT

278 | 50

EXPLANATION

Project Boundary

Battle Mountain District VRM

- Class I
- Class II
- Class III
- Class IV

N

0 1 2 3 4 5 6 7 Miles

IF THE ABOVE BAR DOES NOT SCALE 1 INCH, THE DRAWING SCALE IS ALTERED

BATTLE MOUNTAIN DISTRICT OFFICE
Mount Lewis Field Office
50 Bastian Road
Battle Mountain, Nevada 89820

DESIGN:	EMLLC	DRAWN:	GSL	REVIEWED:	RFD
CHECKED:	-	APPROVED:	RFD	DATE:	08/23/2012

FILE NAME: p1635_Fig3-7-2_VRM.mxd

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Visual Classes Within and Adjacent to the Project

Figure 3.7.2

and some diagonal lines in the background and moderate horizontal lines in the foreground. The most prominent structure visible is the existing road in the foreground that is a diagonal feature against the more prominent horizontal lines of the landscape. The road leads the southbound observer's eyes to Mount Hope.

Figure 3.7.**3**c is a photosimulation showing the landscape as it would appear after mining and post reclamation. There would be a rounded trapezoidal shaped WRDF in the background. Vegetation on the lower portions of the WRDF would be more mature than the upper reaches but would likely blend in with the colors of the surrounding undisturbed areas because the vegetation types would be similar but less mature. The vegetation would be sparser and slightly lighter in color. Exposed ground surfaces would likely be lighter than surrounding undisturbed surfaces due to the different type of lighter colored rocks mined from the open pit.

Figure 3.7.**3**d is a photosimulation showing the fully reclaimed landscape as it would appear after mining and implementation of the Partial Backfill Alternative. The landscape consists of dark blue and mauve colored pyramidal shaped hills in the background with a predominantly tan, brown, and sage green colored flat foreground. There are bold diagonal lines in the background and moderate horizontal lines in the foreground. The most prominent structure visible is the existing road in the foreground that is a diagonal feature against the more prominent horizontal lines of the landscape. The road leads the southbound observer's eyes to Mount Hope.

3.7.3.2.2 KOP #2 - Nevada SR 278 Northwestbound

KOP# 2 is located on SR 278 approximately four miles east southeast of the Project Area. This KOP is located at the point where the Project Area first becomes visible when traveling northbound on SR 278 where the highway turns westward between the Sulphur Range and the Whistler Range and where the majority of the public would first view the full visual effect of the Project. Figures 3.7.3 a, b, c, d, and e show the following: 1) the view of existing conditions (No Action Alternative) (Figure 3.7.**4**a); 2) a photosimulation of the Project build out at Year 20 (Figure 3.7.**4**b); 3) a photosimulation of maximum build out at Year 32 (Figure 3.7.**4**b); 4) a photosimulation of the fully reclaimed Project (Figure 3.7.**4**d); and 5) a photosimulation of the Partial Backfill Alternative (Figure 3.7.**4**e).

Figure 3.7.**4**a is a photograph of the current conditions. The existing landscape consists of a dark blue, mauve, and tan pink colored pyramidal hill in the background and yellow brown and sage green colored flat foreground. There are bold diagonal lines in the background and weak horizontal lines in the foreground. Drill roads in the background are readily evident from KOP #2 because of their horizontal lines and light tan to pink color contrasts with the diagonal lines and blue green color of the background. The existing highway in the foreground is a prominent structure in the foreground. The highway leads the observers eyes to Mount Hope, and its lines and color strongly contrast with those of other foreground features.

Figure 3.7.**4**b is a photosimulation showing build out at Year 20. The landscape consists of Mount Hope, a white pyramidal feature near the center, flanked on the west side by a smooth grey green flat feature (reclaimed) and on the east side a flat trapezoidal feature with light colored material on the top that represents the active PAG WRDF. The middleground shows a tan ovoid shape that is primarily white to gray in color with strong horizontal features that dominate the landscape. The foreground is flat and predominantly tan to yellow brown, sage, and medium green colored. There are bold primarily horizontal lines and some diagonal lines in the

background and middleground and weak horizontal lines in the foreground. The most prominent structure visible in the foreground is the existing road that is a diagonal feature against the more prominent horizontal lines of the landscape. The road leads the northbound observer's eyes to Mount Hope and the LGO Stockpile.

Figure 3.7.**4**c is a photosimulation showing maximum build out at Year 32. The landscape consists of Mount Hope, a white pyramidal feature near the center, flanked on the west side by a smooth grey green flat feature (reclaimed) and on the east side a flat trapezoidal feature with light colored material on the top that represents the active PAG WRDF. The middleground shows a tan ovoid shape that is primarily white to gray in color with strong horizontal features that dominate the landscape. The foreground is flat and predominantly tan to yellow brown, sage, and medium green colored. There are bold primarily horizontal lines and some diagonal lines in the background and middleground and weak horizontal lines in the foreground. The most prominent structure visible in the foreground is the existing road that is a diagonal feature against the more prominent horizontal lines of the landscape. The road leads the southbound observer's eyes to Mount Hope and the LGO Stockpile.

Figure 3.7.**4**d is a photosimulation showing the landscape as it would appear after mining and post-reclamation. A light colored pit highwall and WRDFs would be prominent in the background. The post-mining landscape would be changed from predominantly pyramidal shaped features in the background to rolling features. The WRDFs would be light colored versus the brown and dark green colored existing background. There would still be bold horizontal and diagonal lines. The most prominent structure visible is the existing road in the foreground, a diagonal feature against the more prominent horizontal lines of the landscape. The road leads the southbound observer's eyes to Mount Hope.

Figure 3.7.**4**e is a photosimulation showing the fully reclaimed landscape as it would appear after mining and implementation of the Partial Backfill Alternative. The landscape consists of dark to light blue and white snow covered pyramidal shaped hills in the background. The middleground is dark blue to mauve with a light colored pyramidal and horizontal highwall shape that also shows some of the undisturbed portions of Mount Hope. The flat foreground is predominantly tan, brown, sage, and medium green colored. There are bold diagonal lines in the middleground and moderate horizontal lines in the foreground. The most prominent structure visible is the existing road in the foreground, a diagonal feature against the more prominent horizontal lines of the landscape. The road leads the southbound observer's eyes to Mount Hope.

3.7.3.2.3 KOP #3 - Nevada SR 278 Northbound

KOP #3 is located at the intersection of 11th Street and SR 278 approximately six miles southeast of the Project Area. This KOP is located at the point where the Project Area is visible from ranches located east and southeast of SR 278. Figures 3.7.4 a, b, c, and d show the following: 1) the view of existing conditions (No Action Alternative) (Figure 3.7.**5**a); 2) a photosimulation of Year 44 (Figure 3.7.**5**b); 3) a photosimulation of the fully reclaimed Project (Figure 3.7.**5**c); and 4) a photosimulation of the Partial Backfill Alternative (Figure 3.7.**5**d).

Figure 3.7.**5**a is a photograph of the current conditions. The landscape consists of medium blue and mauve colored pyramidal and rolling hills in the background with some white snow capped mountains in the far background. The middleground is flat and is light yellow, brown, and sage green colored. The foreground is grey pavement and gravel. The background has bold diagonal

lines and weaker horizontal lines. The middleground has horizontal lines. Drill roads in the background are moderately evident from the KOP because of their horizontal lines and tan pink color contrasts with the diagonal lines and blue color of the background. The existing highway in the foreground is a prominent structure. The highway cuts across the foreground; however, the contrasts are minimized by the close proximity of the road to the observer and the horizontal line of the road.

Figure 3.7.**5**b is a photosimulation showing maximum build out at Year 32 with active upper WRDFs. The landscape consists of white snow capped blue mountains in the far background. There is a light colored pyramidal form (Mount Hope) flanked on each side by flat dark blue green forms topped by lighter colored material from WRDFs in the closer background. The middleground is flat and is light yellow, brown, and sage green colored. The foreground is grey pavement and gravel. The background has bold horizontal and moderate diagonal lines. The middleground has horizontal lines. The existing highway in the foreground is a prominent structure. The highway cuts across the foreground; however, the contrasts are minimized by the close proximity of the road to the observer and the horizontal line of the road.

Figure 3.7.**5**c is a photosimulation showing the landscape as it would appear after mining and post-reclamation. A pit highwall and WRDFs would be prominent in the background. The post-mining landscape would be changed from predominantly pyramidal shapes in the background to flat/rectangular shapes. The color would change from grey colors to blue green after revegetation. The Project would add a bold horizontal line component to the background.

Figure 3.7.**5**d is a photosimulation showing the fully reclaimed landscape as it would appear after mining and implementation of the Partial Backfill Alternative. The landscape consists of white snow-capped blue mountains in the far background. A pit highwall would be prominent in the background along with medium blue and mauve colored rolling hills.

3.7.3.2.4 KOP #4 - Eureka County Fairgrounds

KOP #4 is located at the east end of the Eureka County Fairgrounds approximately 20 miles southeast of the Project Area. This KOP is located at a point where the public gathers and would be able to observe the Project Area off in the distance. Figures 3.7.5 a, b, c, and d show the following: 1) the view of existing conditions (No Action Alternative) (Figure 3.7.**6**a); 2) a photosimulation of Year 35 (Figure 3.7.**6**b); 3) a photosimulation of the fully reclaimed Project (Figure 3.7.**6**c); and 4) a photosimulation of the Partial Backfill Alternative (Figure 3.7.**6**d).

Figure 3.7.**6**a is a photograph of the current conditions. The landscape consists of white snow-capped blue colored mountains in the far background. The closer background landscape contains medium blue and mauve colored, pyramidal shaped features with bold diagonal lines. The middleground has a green hummocky irregular line. The foreground has light tan to pink features with horizontal and diagonal lines. The structures in the foreground include a pink colored road and parking area with bold horizontal lines; green colored fence with horizontal lines and vertical fence posts, and brown colored power poles with vertical lines.

Figure 3.7.**6**b is a photosimulation at maximum build out at Year 32, with active upper WRDFs. The landscape consists of white snow capped blue mountains in the far background. The closer background landscape contains a grey prominent pyramidal shaped form (pit highwall) flanked by medium blue and mauve colored features with bold diagonal lines. The middleground has a

green hummocky irregular line. The foreground has light tan to pink features with horizontal and diagonal lines. The structures in the foreground include a pink colored road and parking area with bold horizontal lines, green colored fence with horizontal lines and vertical fence posts, and brown colored power poles with vertical lines.

Figure 3.7.**6**c is a photosimulation showing the landscape as it would appear after mining and post-reclamation. A pit highwall would be prominent in the background. Contrasts between the existing conditions and the proposed Project would be minimized by the distance from the observation point. There would be a strong contrast in color between the existing blue to mauve color and the lighter color of the mined area.

Figure 3.7.**6**d is a photosimulation showing the fully reclaimed landscape as it would appear after mining and implementation of the Partial Backfill Alternative. This alternative would result in the same view as 3.7.5c except that the skyline angle on the east side of Mount Hope would be steeper because of the removal of the North WRDF.

3.7.3.2.5 KOP #5 – U.S. Highway 50

KOP #5 is located on U.S. Highway 50 at the intersection of Roberts Creek Ranch Road. This KOP is located at the point where the south side of the Project Area is prominently visible when traveling eastbound on U.S. Highway 50 and the Roberts Creek Ranch Road. The KOP is approximately 15 miles south of the Project Area. Figures 3.7.6 a, b, c, and d show the following: 1) the view of existing conditions (No Action Alternative) (Figure 3.7.**7**a); 2) a photosimulation of Year 44 (Figure 3.7.**7**b); 3) a photosimulation of the fully reclaimed Project (Figure 3.7.**7**c); and 4) a photosimulation of the Partial Backfill Alternative (Figure 3.7.**7**d).

Figure 3.7.**7**a is a photograph of the current conditions. The existing background landscape would consist of medium blue and mauve colored pyramidal forms, which have bold horizontal and diagonal lines. The middleground is flat with grey green and medium brown colors. The lines are horizontal. The foreground is flat with grey and sage green colors with weak horizontal lines and green hummocky blobs. The structures in the foreground are a tan colored parking area with a horizontal line and a brown colored fence with a horizontal line and strong vertical features.

Figure 3.7.**7**b is a photosimulation at maximum build out at Year 44 with the unreclaimed North TSF. The existing background landscape would consist of a mauve colored pyramidal form with a strong contrast between the lighter colored highwall and the medium blue rolling to angular hills on either side of Mount Hope, which have bold horizontal and diagonal lines. The middleground is flat with a strongly contrasting white narrow rectangular form near the center and a brown narrow rectangular form to the east. The lines are horizontal. The foreground is flat with grey and sage green colors with weak horizontal lines and green hummocky blobs. The structures in the foreground are a tan colored parking area with a horizontal line and a brown colored fence with a horizontal line and strong vertical features.

Figure 3.7.**7**c is a photosimulation showing the landscape as it would appear after mining and post-reclamation. The existing background landscape would consist of a medium blue colored pyramidal form with a strong contrast between the lighter colored highwall and the medium blue rolling to angular hills on either side of Mount Hope, which have bold horizontal and diagonal lines. The middleground view is flat with weakly contrasting brownish narrow rectangular

horizontal forms. The foreground view is flat with grey and sage green colors with weak horizontal lines and green hummocky blobs. The structures in the foreground are a tan colored parking area with a horizontal line and a brown colored fence with a horizontal line and strong vertical features.

Figure 3.7.7d is a photosimulation showing the fully reclaimed landscape as it would appear after mining and implementation of the Partial Backfill Alternative. This alternative would result in the same view as 3.7.6c except that more of the lighter colored pit highwall would be visible because of the removal of the PAG WRDF.

3.7.3.3 Proposed Action

3.7.3.3.1 KOP Effects

The primary visual resources issues would include the following: 1) the development of a viewshed that could be seen from multiple sites and is substantially different than the existing viewshed; and 2) the ultimate appearance of the Project at full reclamation.

The results of the contrast rating assessment for KOP #1 indicate that there would be moderate contrast in the form, line and color between the existing landscape and the post-mining/post-reclamation background landscape. Excluding the open pit, any color contrast would be naturally mitigated after revegetation of the dump and after the vegetation matures. The changes, as described and viewed from KOP #1, would conform with the area's Visual Class III and IV designations.

The results of the contrast rating assessment for KOP #2 found that there would be a strong contrast in the form and color between the existing landscape and the post-mining/post-reclamation landscape. Except for the open pit area, the color contrast would be mitigated after revegetation of the dumps and after the vegetation matures. The open pit area would still be visible from the KOP even when the Proposed Action is fully reclaimed and would have a sustained substantial contrast to the surrounding reclaimed facilities and undisturbed topography. Since the view from this portion of the Project Area has a Class III designation the changes would not conform to the VRM objectives for the area.

The results of the contrast rating assessment for KOP #3 found that there would be a strong contrast in form, line and color between the existing landscape and the post-mining landscape. The color contrast should mitigate over time as the vegetation on the waste rock dumps matures to include more shrubs and trees. Within this distance zone, particularly during midday light conditions, color, form, and line contrasts created by the Proposed Action would be evident. Given the distance and visual aspect of the Project, the changes in the landscape conform to the VRM objectives for the area, which is Class III or IV, depending on which portion of the Project Area is viewed.

The results of the contrast rating assessment for KOP #4 found that there would be a strong contrast in the color of the land and vegetation. The color contrast should mitigate over time as the vegetation on the waste rock dumps matures to include more shrubs and trees. Within this distance zone, particularly during midday light conditions, color, form, and line contrasts created by the Proposed Action would be evident. Given the distance and visual aspect of the Project, the

changes in the landscape conform to the VRM objectives for the area, which are Class III or IV, depending on which portion of the Project is viewed.

The results of the contrast rating assessment for KOP #5 found that there would be a strong contrast in the color of the land, vegetation and structures. The color contrast should mitigate over time as the vegetation on the waste rock dumps and tailings matures to include more shrubs and trees. Within this distance zone, particularly during midday light conditions, color, form, and line contrasts created by the Proposed Action would be evident. The changes in the landscape conform to the VRM objectives for the area, which is Class IV.

Visual contrast would be reduced by reclamation practices, which would consist of recontouring and revegetating the WRDFs and the TSFs facility slopes; recontouring and revegetating exploration roads; and removing all buildings, structures, and equipment brought to the site, before recontouring and revegetation of all building sites. Following successful reclamation, the visual contrast of the Proposed Action would be slightly reduced. The use of surrounding landscape colors and native plant materials are appropriate means of reducing visual contrast. Over the long term, natural vegetation would begin to blend with the color and texture of the existing natural landscape. Although recontouring and revegetation of the disposal and heap leach/tailings areas would help to reduce the color and form contrasts, the scale of visual disturbance of these modified pyramidal landforms would remain visually evident. Buildings associated with the Proposed Action could draw the viewer's eye due to the color and form during mining and processing operations. The Proposed Action would not otherwise impact visual resources.

- **Impact 3.7.3.3-1:** The proposed mining activities would be visible from all five KOPs. The visual impacts would be consistent with VRM Class IV management at KOPs #1, #3, #4, and #5. From KOP #2, which is the only KOP where the Class III management area is visible, the view is not consistent with that management class.

  Significance of the Impact: This impact is considered significant because of the views from KOP #2. The following mitigation measure would reduce the adverse effects of the impact.

- **Mitigation Measure 3.7.3.3-1:** For reducing visual contrast, minimization of disturbance would be the most effective mitigation technique. Where disturbance is proposed, repetition of the basic landscape elements (form, line, color, and texture) would be implemented to minimize visual change. **In order to lessen long-term visual impacts from the pit wall, treatment may be required to ensure that the final pit wall mimics the surrounding landscape colors as visible from KOP #2. Methods could include, but are not limited to, painting, staining, varnishing, or some other treatment that minimizes the contrast of the visibly exposed and unweathered rock of the pit wall. Any mitigation applications must be pH neutral and contain no caustic or alkaline chemicals to avoid potential adverse environmental impacts. Treatment may occur when the pit wall reaches its final slope configuration. The need for this treatment would be determined by the BLM at that time based on the color of the exposed pit wall surface and its contrast with the surrounding landscape. Specific dimensions and areas of mitigation would be determined by the BLM, based on the actual color of the final pit wall.**

Figure 3.7.3a: Kop #1: No Action Alternative. Looking south (approximately seven miles) at Mount Hope from 0.2 miles south of mile marker #27 on State Highway 278.

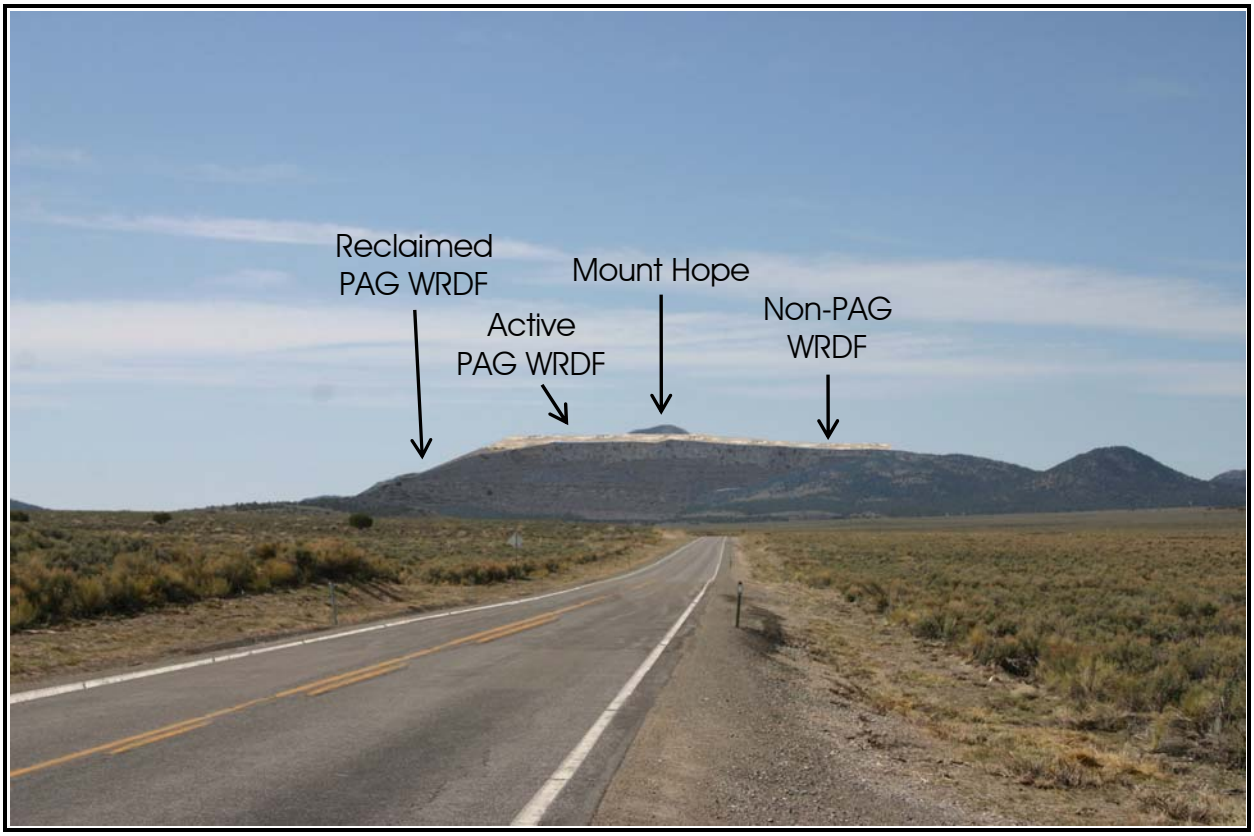


Figure 3.7.3b: KOP #1: Proposed Action Maximum Build Out (Year 32) with active upper WRDFs.

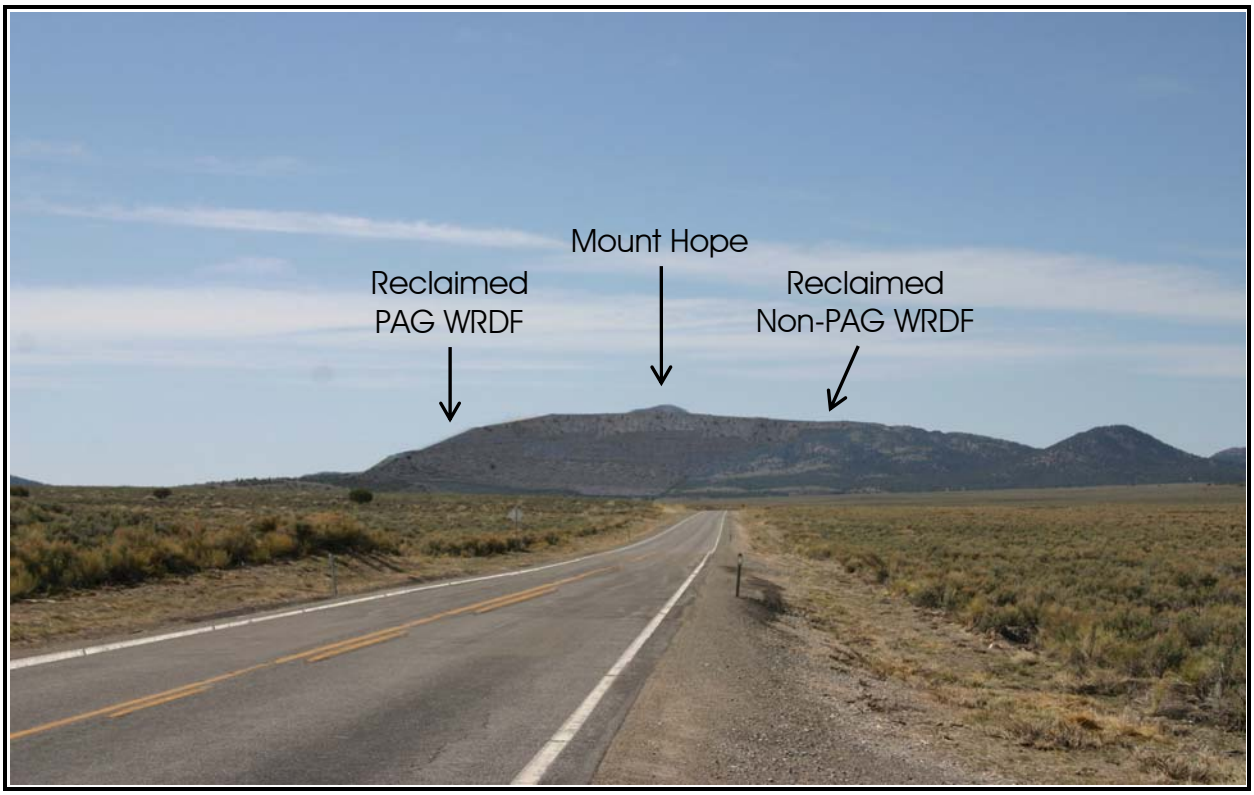


Figure 3.7.3c: KOP #1: Proposed Action Fully Reclaimed.

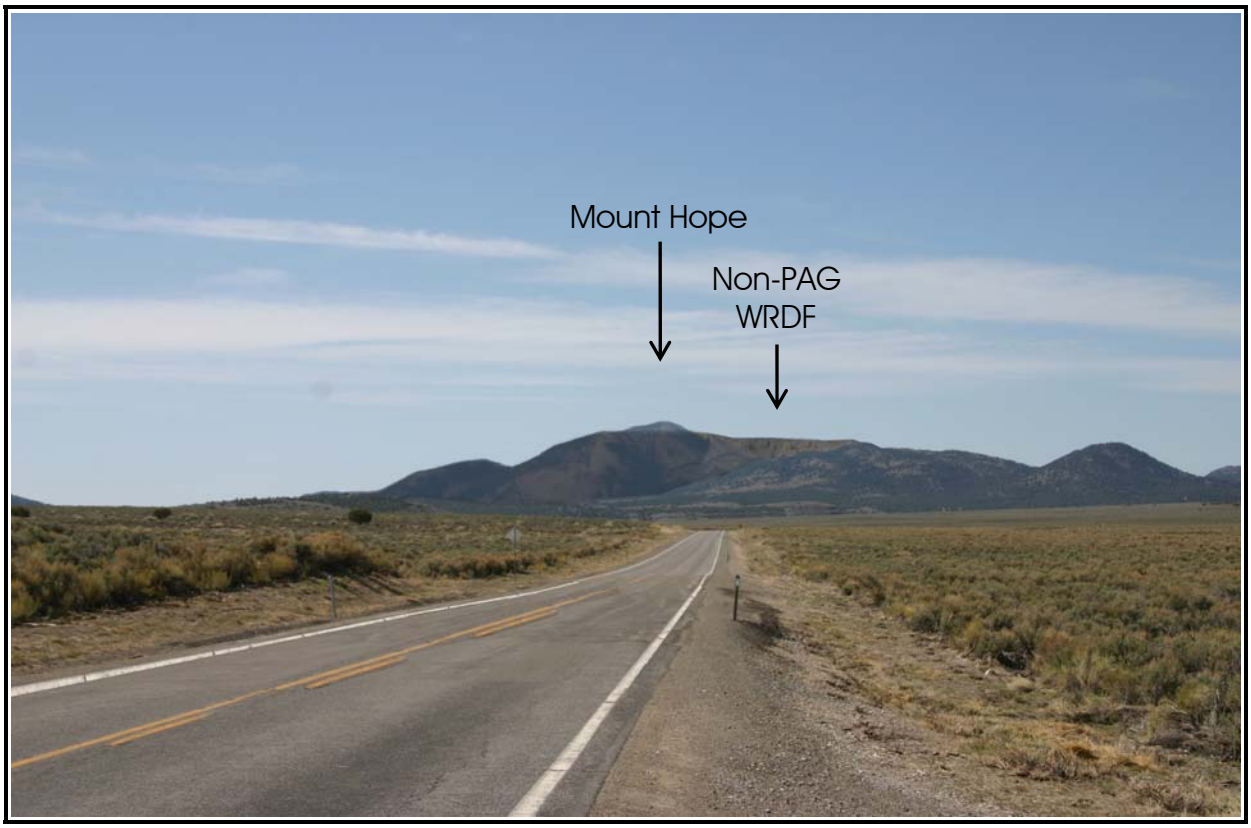


Figure 3.7.3d: KOP #1: Partial Backfill Alternative Fully Reclaimed.

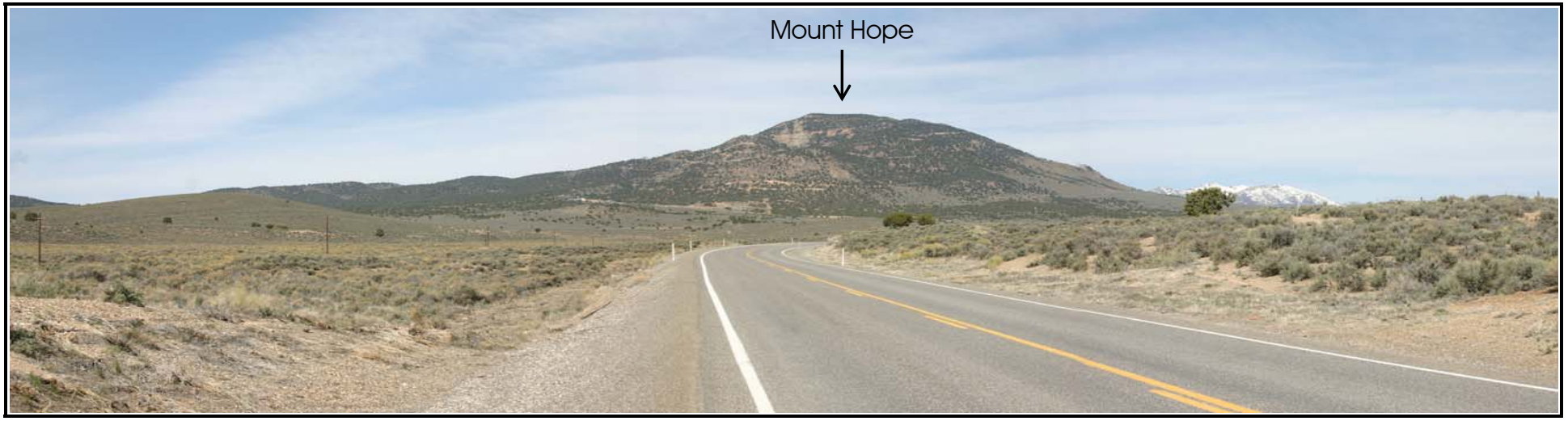


Figure 3.7.4a: KOP #2: No Action Alternative. Looking north-northwest at Mount Hope approximately four miles from State Highway 278.

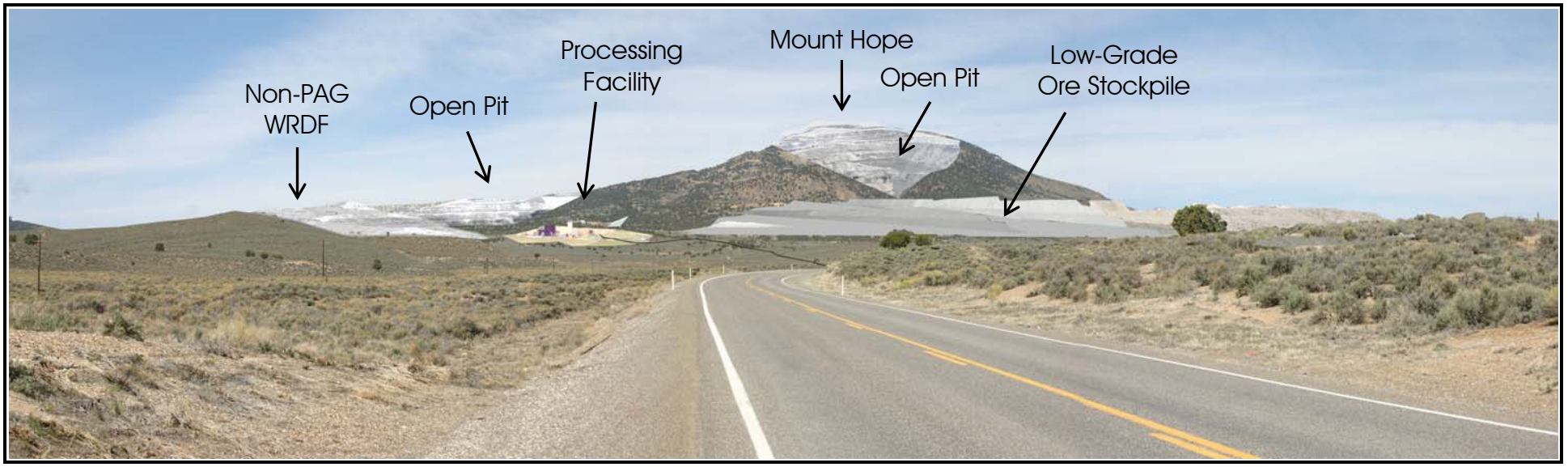


Figure 3.7.4b: KOP #2: Proposed Action Year 20 Build Out.

Figure 3.7.4c: KOP #2: Proposed Action Maximum Build Out (Year 32). Active waste rock dumps and low-grade ore stockpiles.

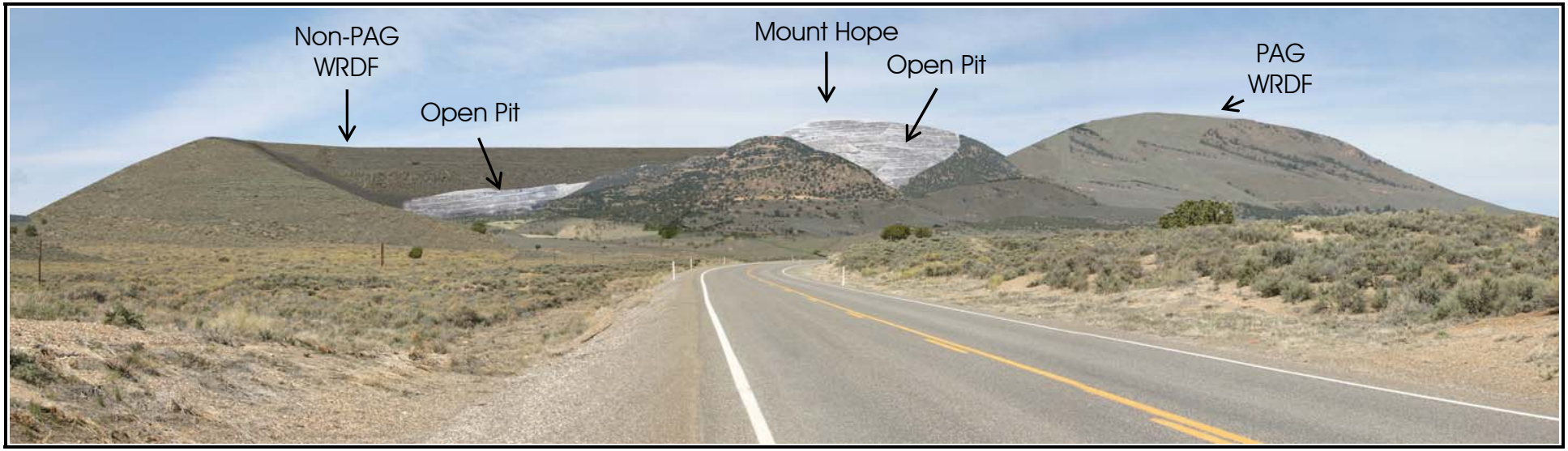


Figure 3.7.4d: KOP#2: Proposed Action Fully Reclaimed.

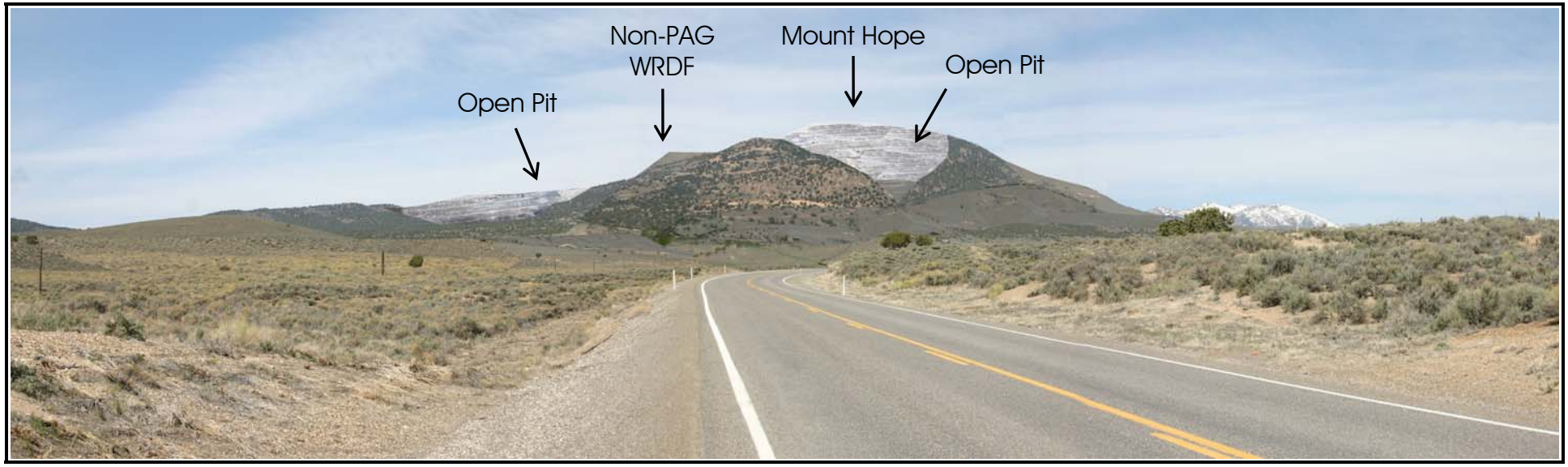


Figure 3.7.4e: KOP #2: Partial Backfill Alternative Fully Reclaimed.

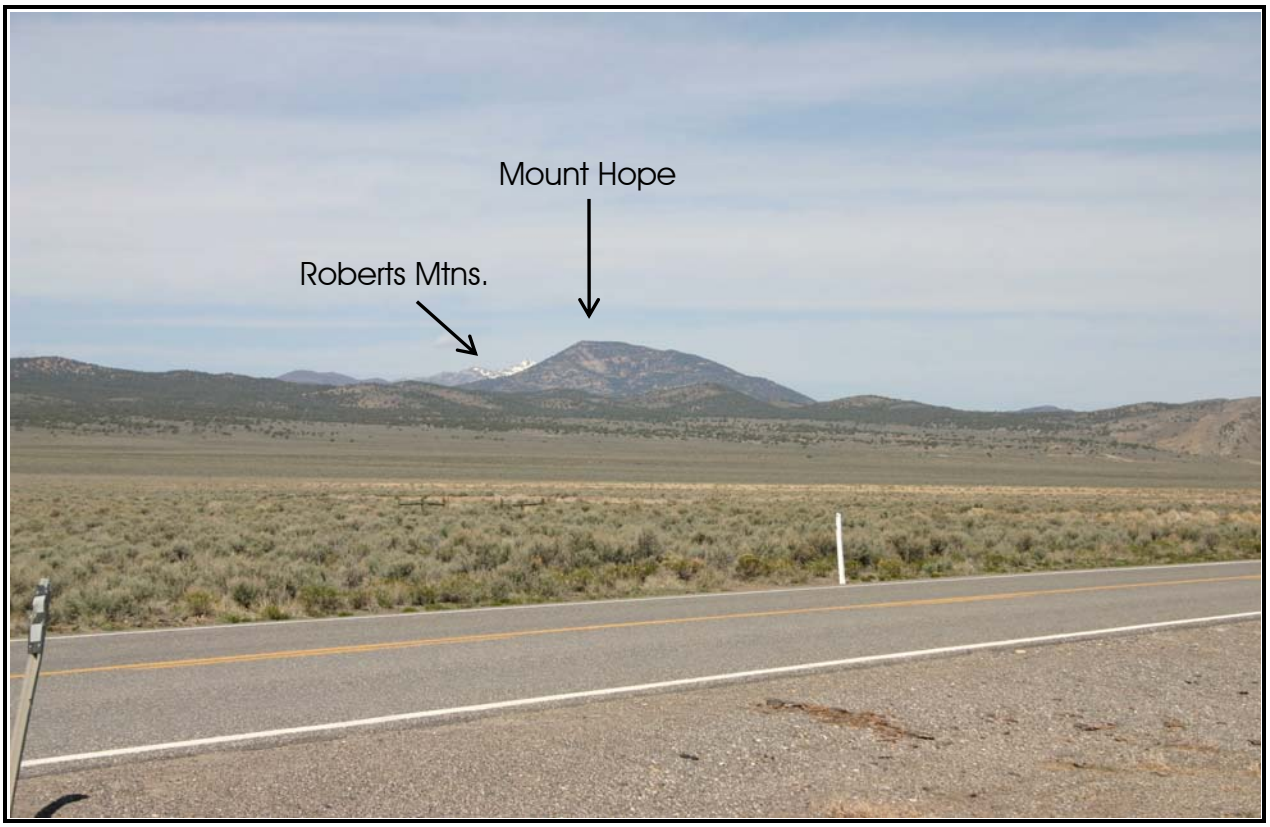


Figure 3.7.5a: KOP #3: No Action Alternative. Looking northwest at Mount Hope approximately eight miles from 11th Street intersection with State Highway 278.

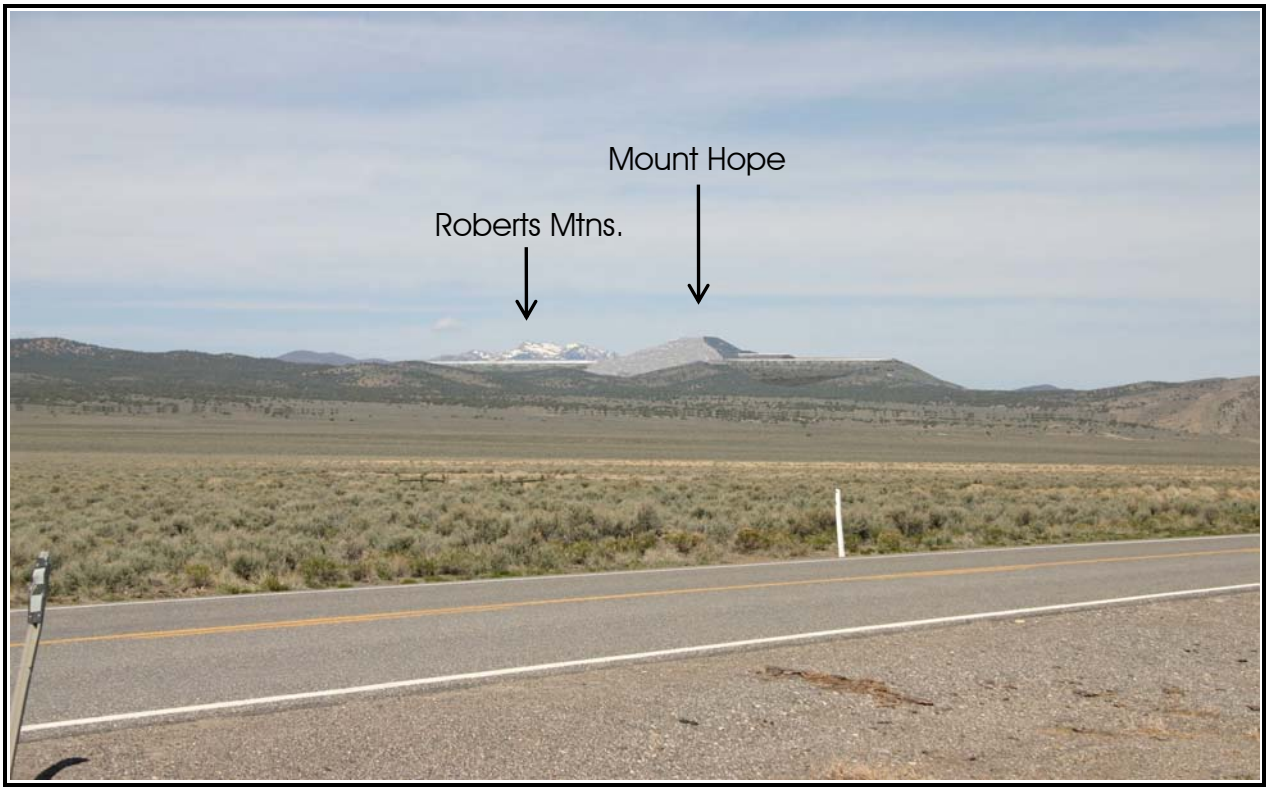


Figure 3.7.5b: KOP #3: Proposed Action Maximum Build Out (Year 32) with active upper WRDFs.

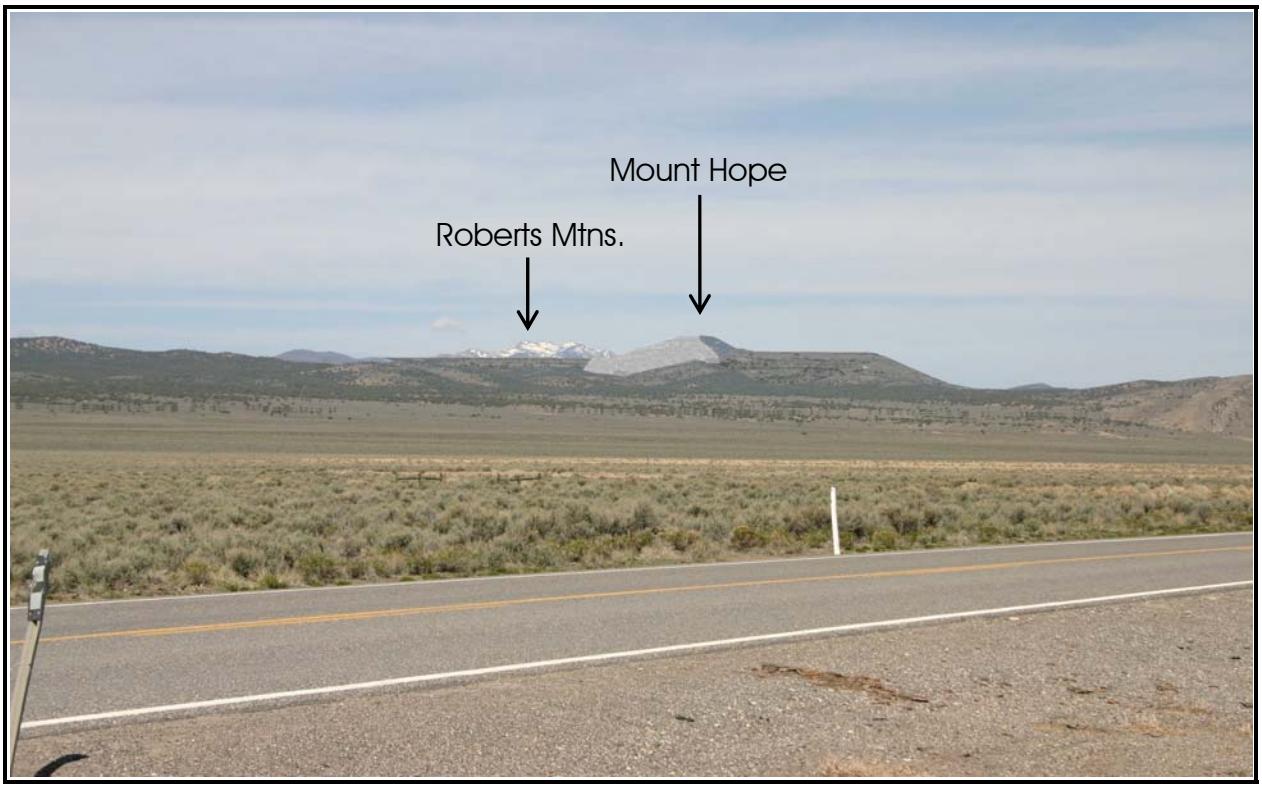


Figure 3.7.5c: KOP #3: Proposed Action Fully Reclaimed.

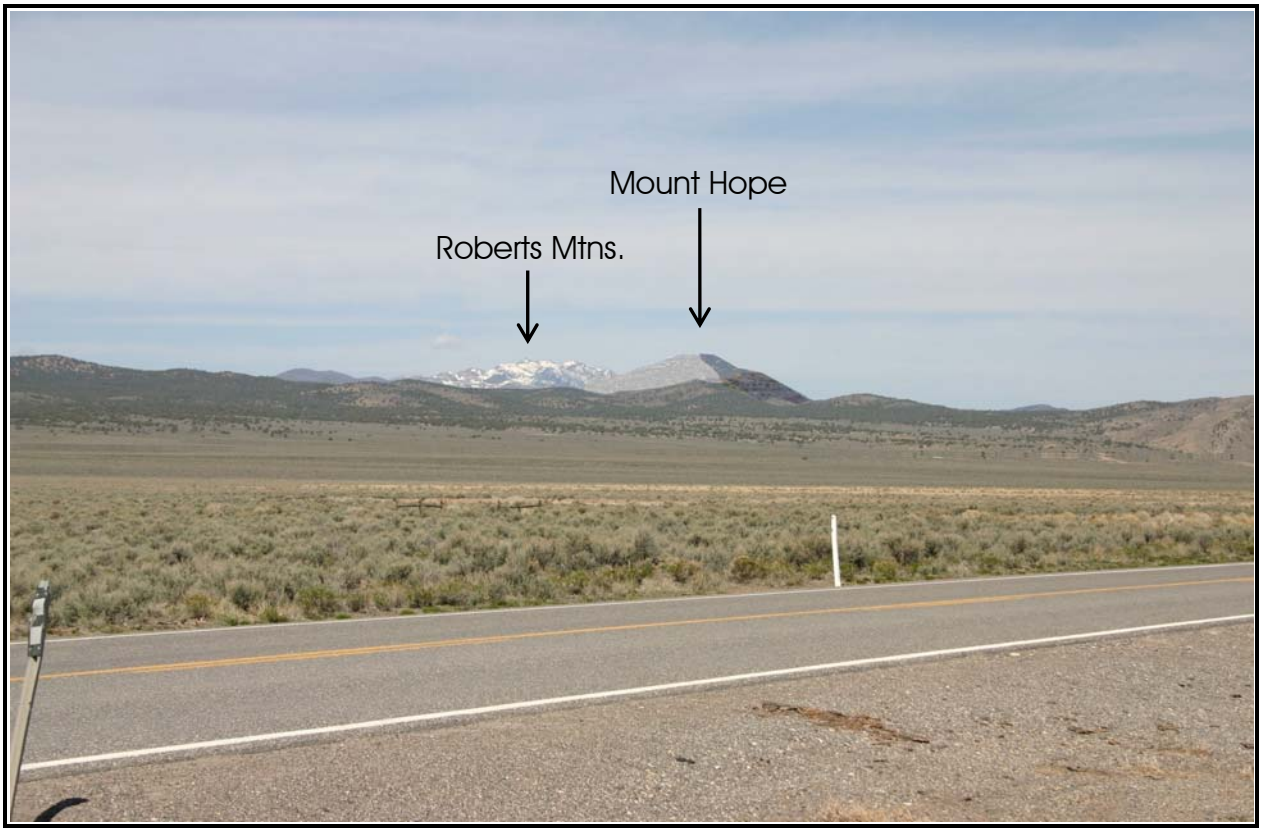


Figure 3.7.5d: KOP #3: Partial Backfill Alternative Fully Reclaimed.

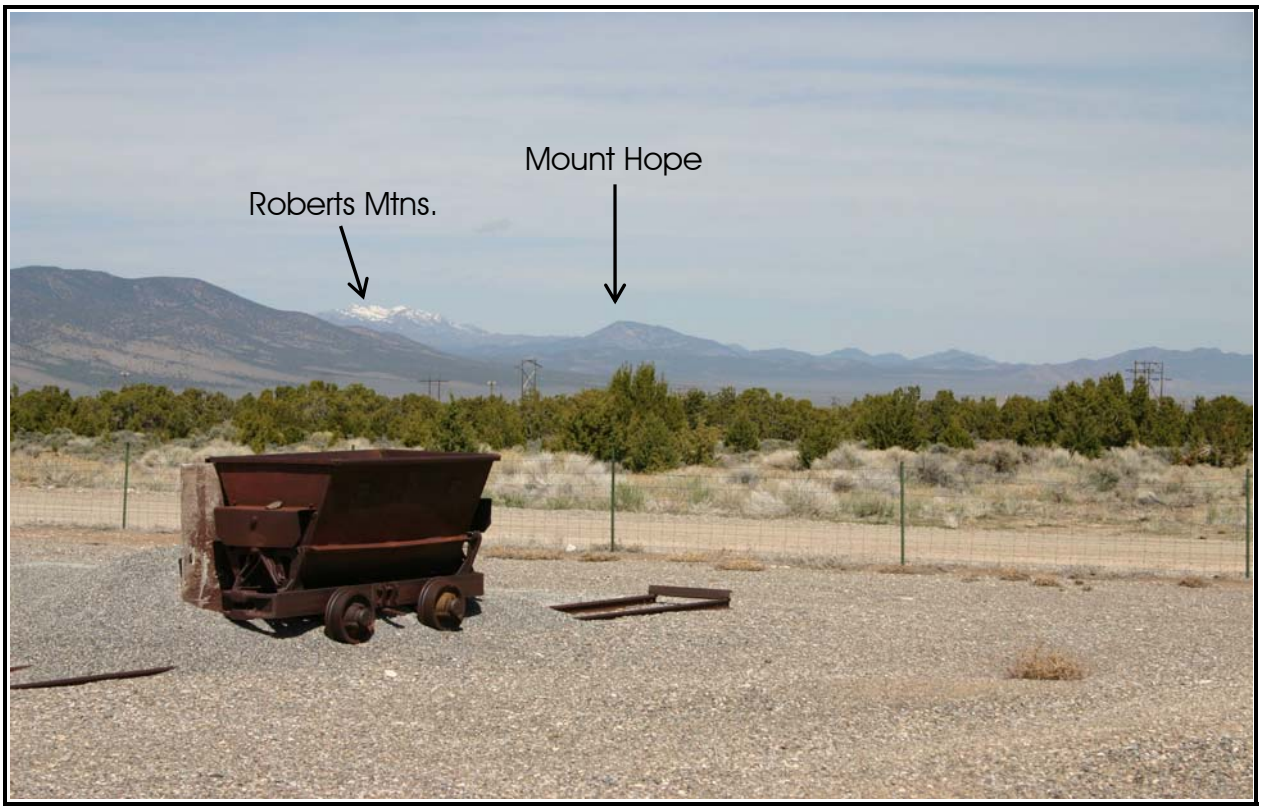


Figure 3.7.6a: KOP #4: No Action Alternative. Looking northwest from the Eureka County Fairgrounds (approximately 22 miles).

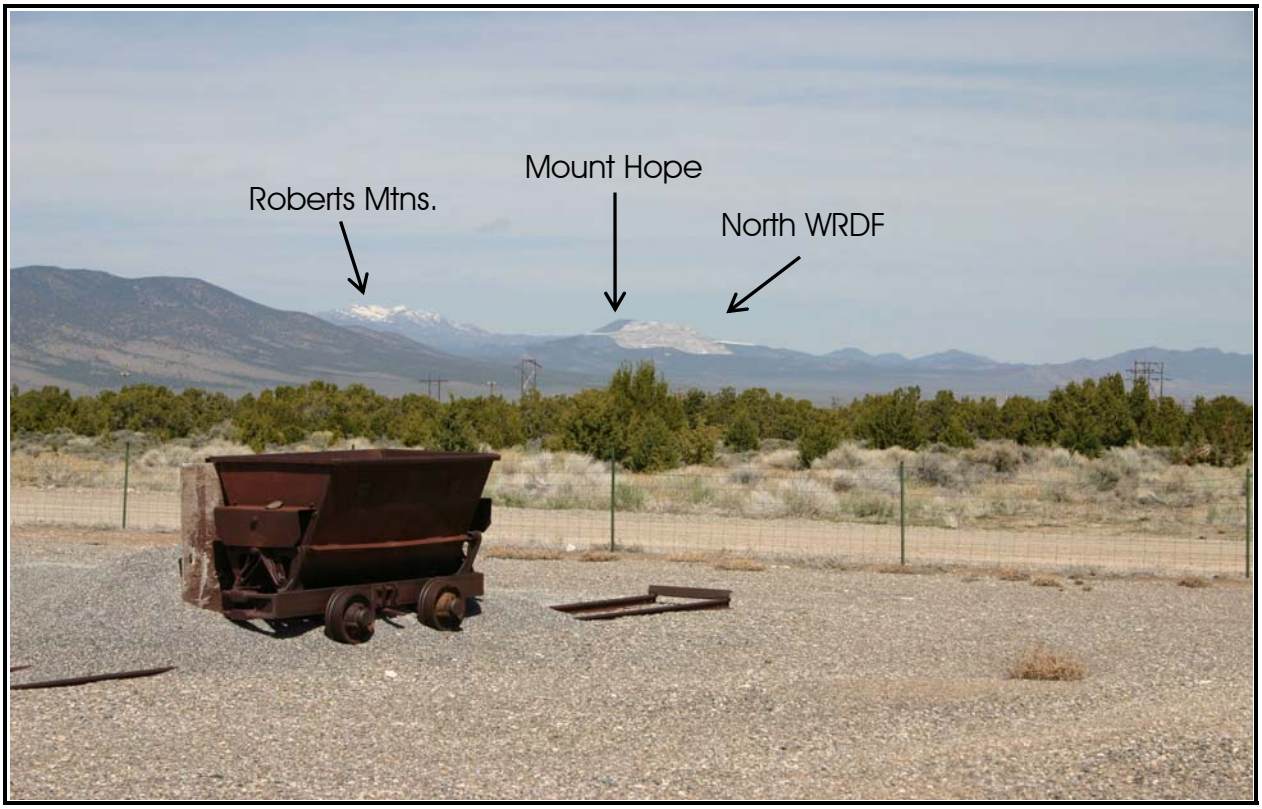


Figure 3.7.6b: KOP #4: Proposed Action Maximum Build Out (Year 32) with active upper WRDFs

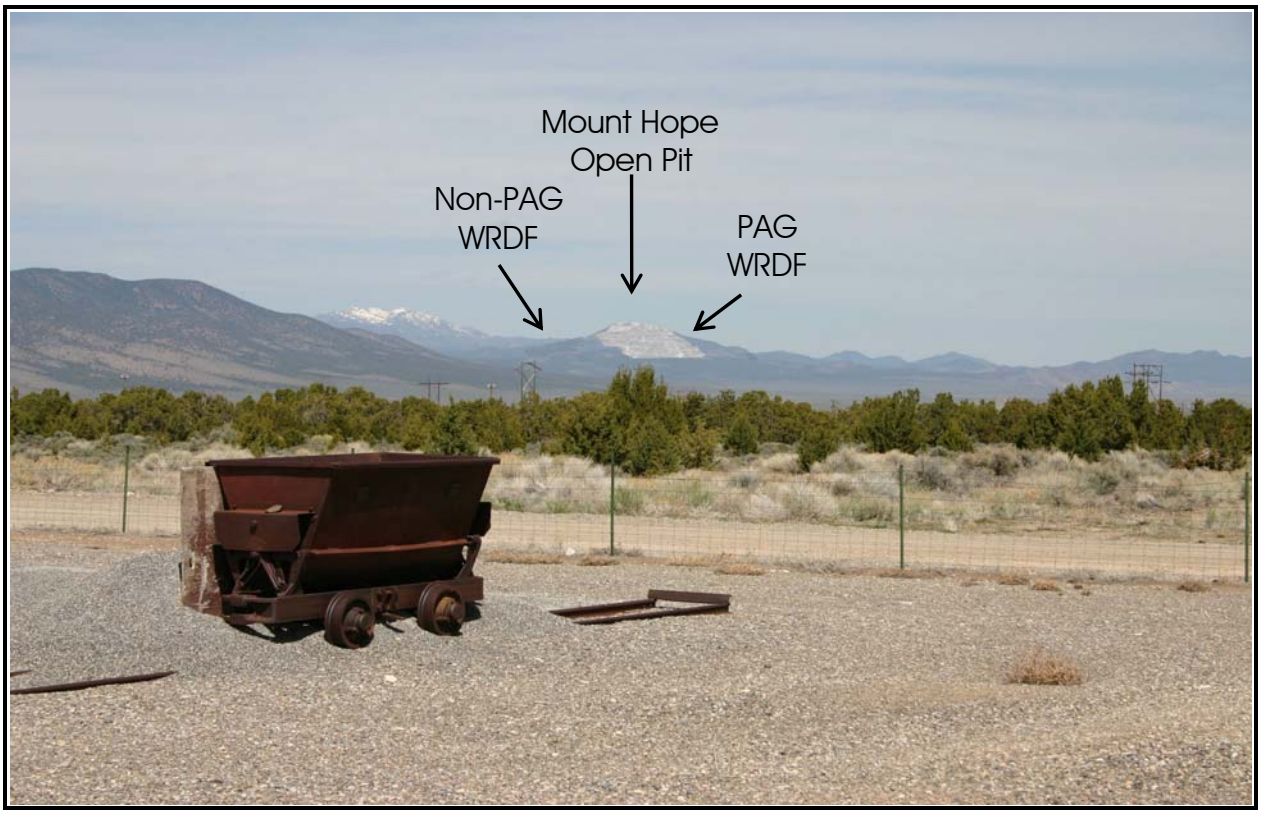


Figure 3.7.6c: KOP #4: Proposed Action Fully Reclaimed.

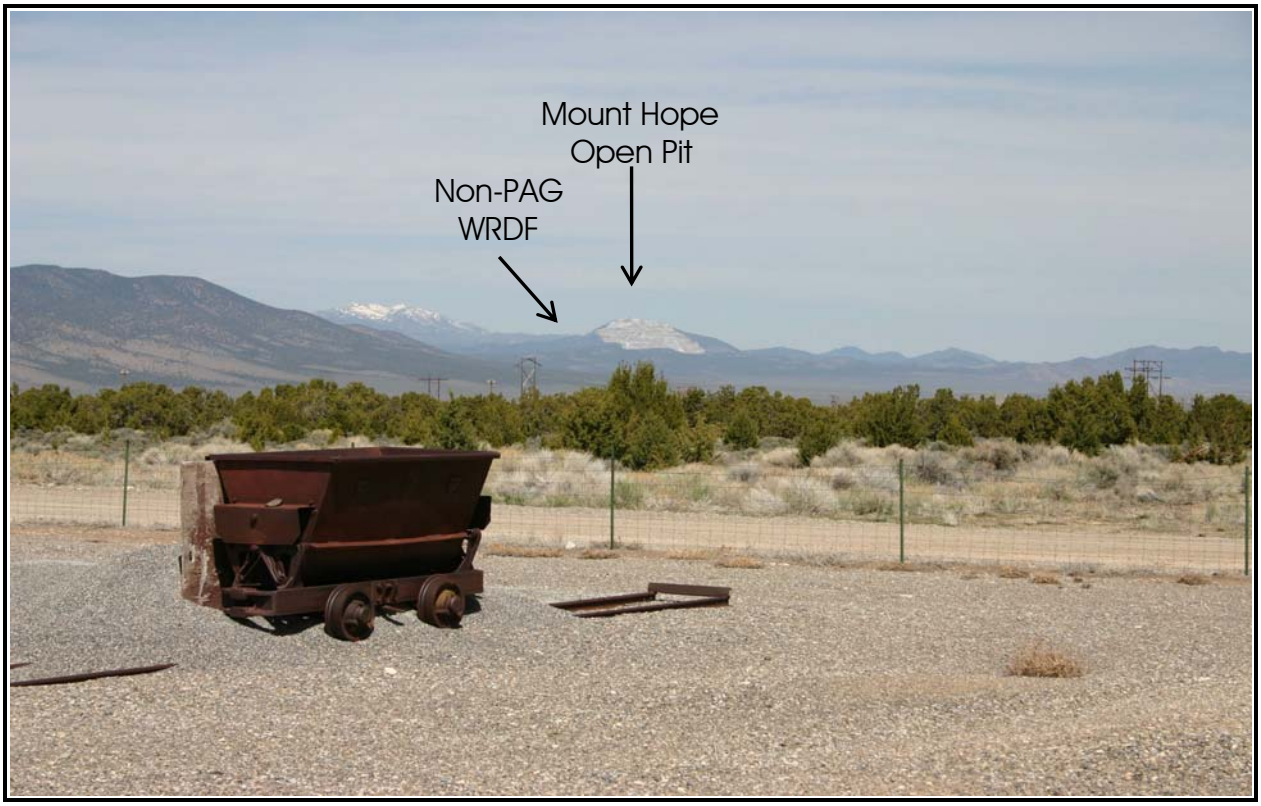


Figure 3.7.6d: KOP #4: Partial Backfill Alternative.

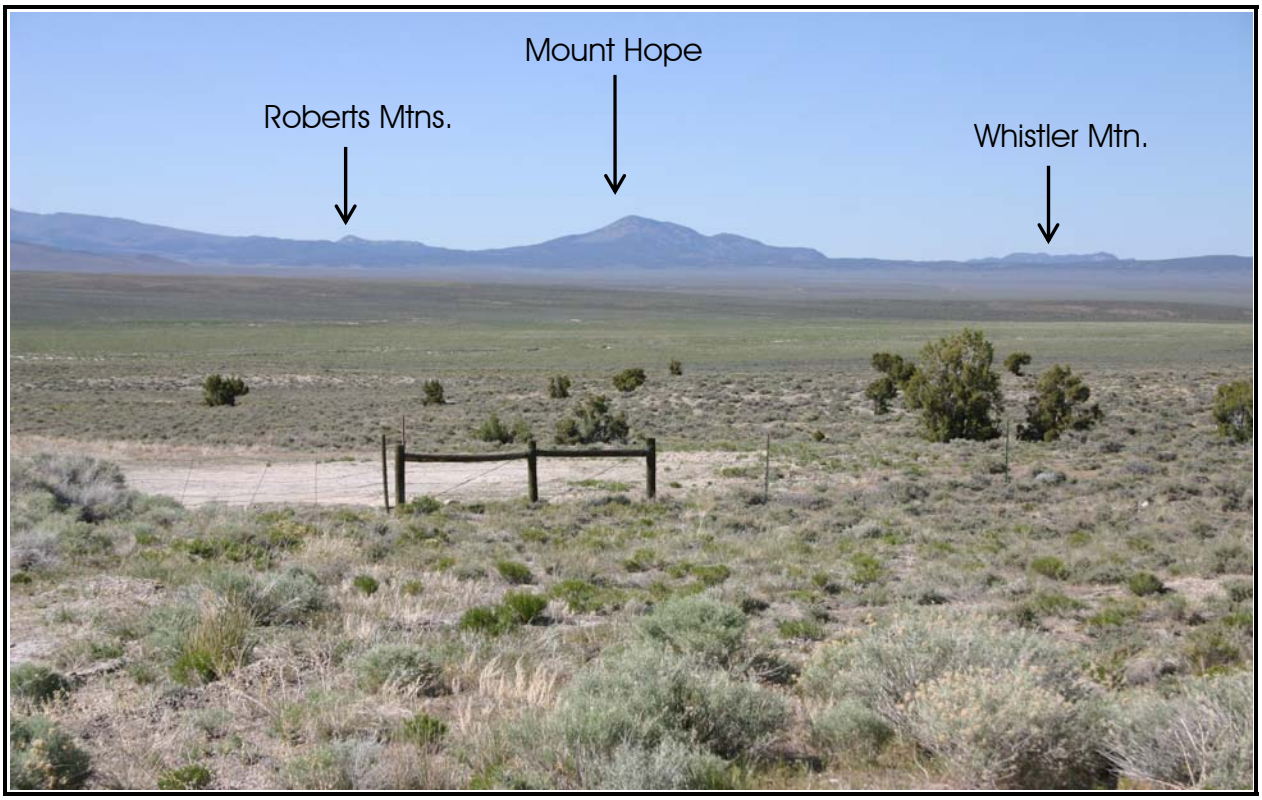


Figure 3.7.7a: KOP #5: No Action Alternative. Looking northerly approximately 17 miles from intersection of Roberts Creek Road and Highway 50.

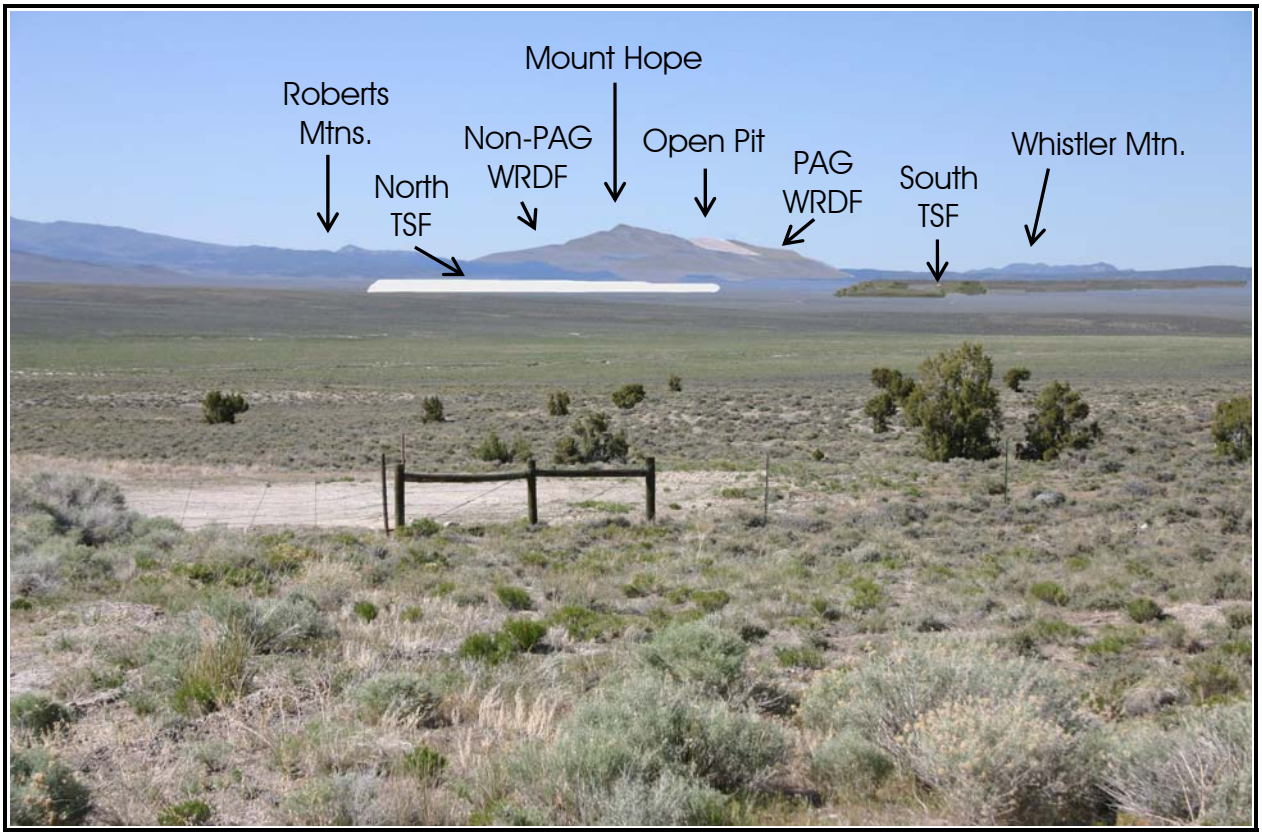


Figure 3.7.7b: KOP #5: Proposed Action Maximum Build Out (Year 44).

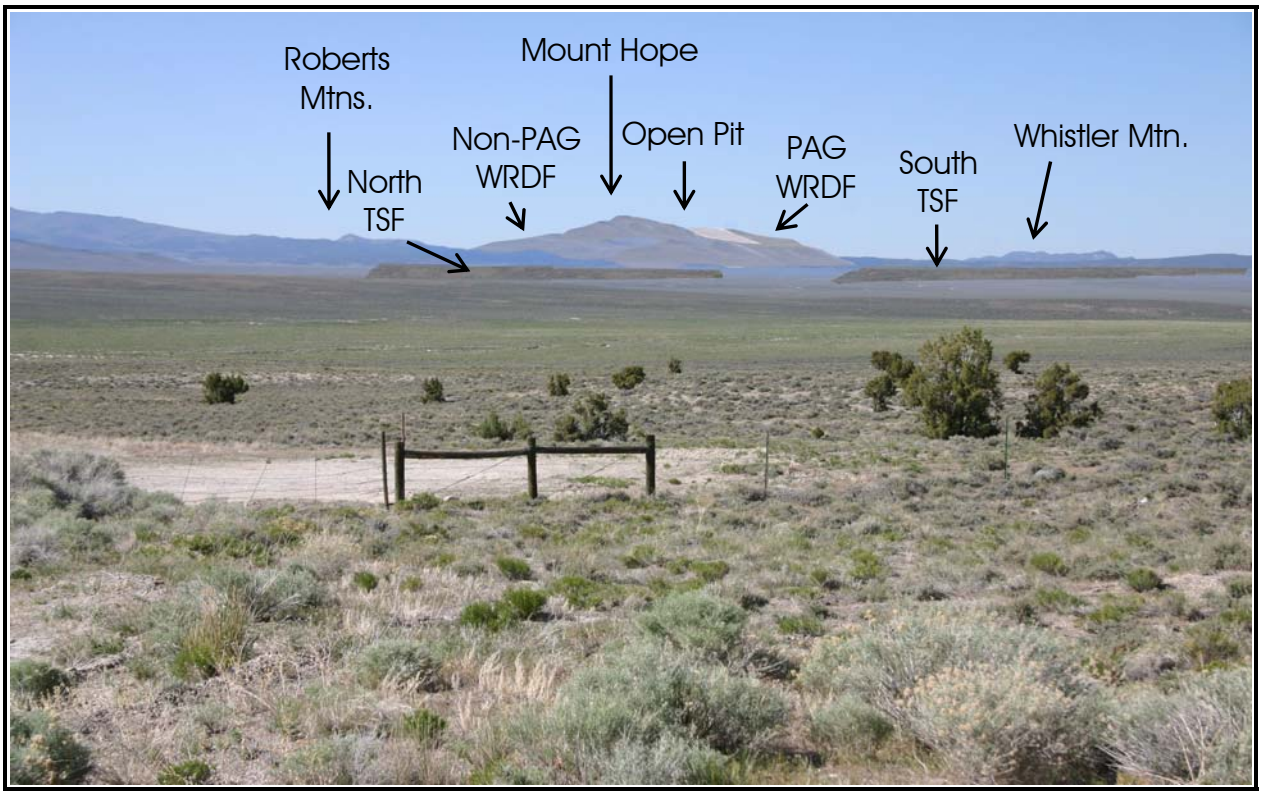


Figure 3.7.7c: KOP #5: Proposed Action Fully Reclaimed.

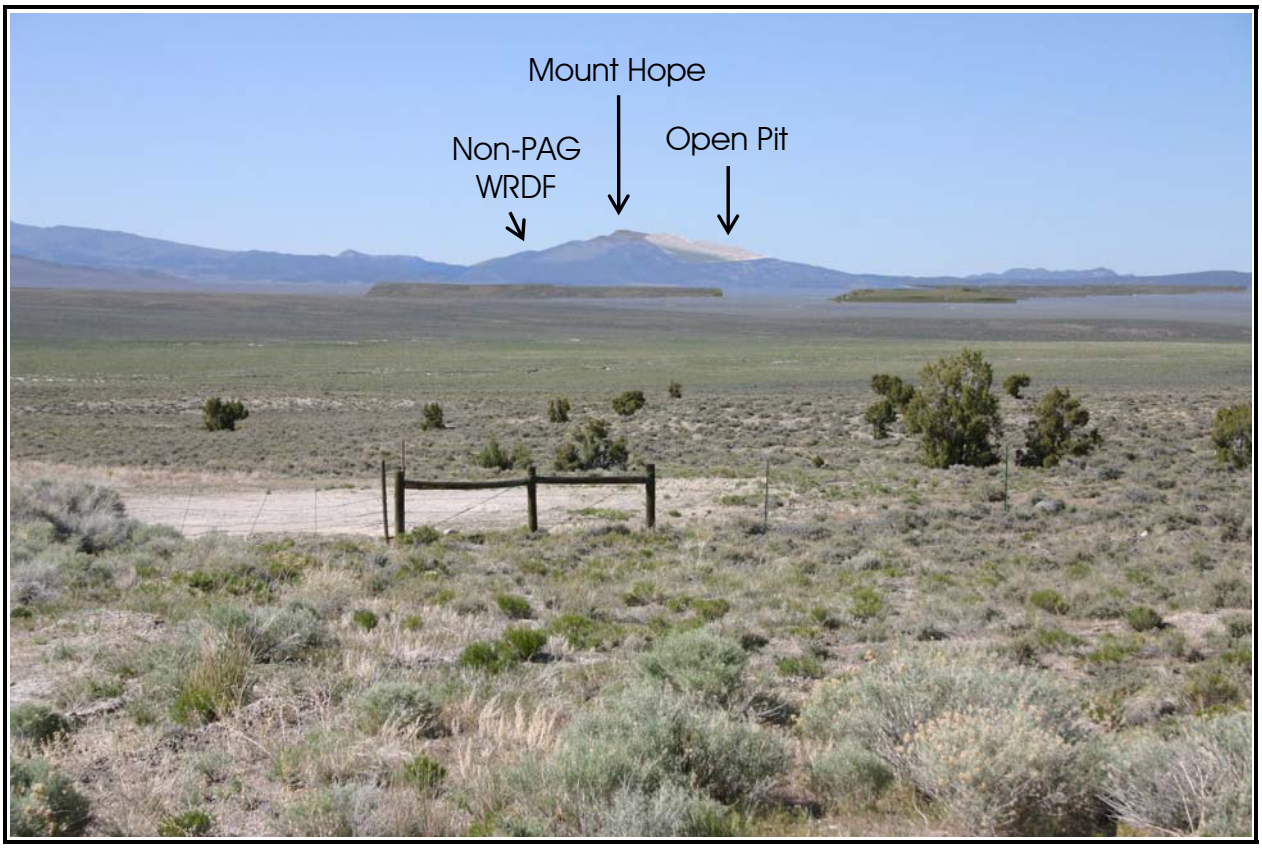


Figure 3.7.7d: KOP #5: Partial Backfill Alternative Fully Reclaimed.

Clearing of land for WRDFs and facility construction would be done by creating curvilinear boundaries instead of straight lines to minimize disturbance of the landscape. Grading would proceed in a manner that would minimize erosion and conform to the natural topography. Revegetation following recontouring would also reduce visual impacts. The specifics on the final reclamation design implementation would be completed in consultation with interested parties.

- **Effectiveness of Mitigation and Residual Effects:** The effectiveness of this mitigation in reducing the impact to less than significant is not likely; however, given the type and scale of the action this mitigation would be the most effective approach at limiting the impact. The Proposed Action would result in unavoidable physical change in the existing contour and character of the Project Area. The changes would be visibly most apparent over the active life of the Project, but would diminish through the completion of reclamation and revegetation activities contained as part of the Proposed Action. The physical changes to the area would be permanent, but would lessen following the completion of final reclamation as natural processes continue to soften the line and form to match the surrounding landscape.

- **Impact 3.7.3.3-2:** The proposed buildings associated with mining activities would be visible from KOP #2 during mining and processing operations, which is not consistent with VRM Class III management.

  Significance of the Impact: This impact is considered significant because of the views from KOP #2. The following mitigation measure would reduce the adverse effects of the impact.

- **Mitigation Measure 3.7.3.3-2:** Visual contrast, associated with the buildings, would be reduced by using construction materials or paints that are earth tones. This would minimize color contrasts with the surrounding landscape and help meet VRM objectives.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of this measure would minimize color contrasts within the viewshed and effectively mitigate visual impacts from the buildings. There would be no residual effects from this impact.

3.7.3.3.2 Lighting Effects

The Proposed Action would result in unavoidable increases in the amount of light pollution associated with lighting required primarily for safety at the various facilities (processing facility, WRDFs, roads, etc.).

- **Impact 3.7.3.3-3:** The proposed mining activities would increase light pollution in the region.

  Significance of the Impact: This impact is not considered significant; however, the following mitigation measure would reduce the adverse effects of the impact.

- **Mitigation Measure 3.7.3.3-3:** To maintain dark sky conditions, and minimize visual disturbance, facility perimeter lighting, including lighting used to illuminate walkways, roadways, staging areas and parking areas, would be shielded so that the light would be

cast in a downward direction. Low-pressure sodium lighting (or an improved technology, if readily available) would be used to reduce or eliminate detrimental lighting impacts and prevent unnecessary light pollution.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of this measure would reduce the effects on the surrounding area and effectively mitigate impacts associated with light pollution in keeping with the objectives of dark sky goals.

3.7.3.4 No Action Alternative

Under the No Action Alternative, EML would not be authorized to develop the Project and mine the Mount Hope ore body as currently defined under the Proposed Action. The No Action Alternative would result from the BLM disallowing the activities proposed under the Plan (EML 2006); however, EML would be able to continue exploration activities as outlined in previously submitted Notices. Refer to Section 1.3 for a discussion of the existing Notice level activities. The area would remain available for future mineral development or for other purposes as approved by the BLM and at the time those actions are proposed and they would be subject to additional site specific environmental analysis.

3.7.3.4.1 KOP Effects

Under the No Action Alternative, none of the impacts associated with the Proposed Action would occur. Any visual impacts generated by exploration activities under Notice-level activities would be below the level of significance.

Under the No Action Alternative there would be no Residual Adverse Impacts.

3.7.3.4.2 Lighting Effects

Under the No Action Alternative, none of the impacts associated with the Proposed Action would occur. Any light pollution generated by exploration activities under Notice-level activities would be below the level of significance.

Under the No Action Alternative there would be no Residual Adverse Impacts.

3.7.3.5 Partial Backfill Alternative

Under this alternative, the Proposed Action would be developed and have the same surface disturbance footprint; however, at the end of mining, the open pit would be partially backfilled to eliminate the potential for a pit lake. The open pit would be backfilled to an elevation that varies from northwest to southeast across the open pit from approximately 7,300 to 6,850 feet amsl. The backfilling would commence in Year 32 and be completed in approximately 13 years.

3.7.3.5.1 KOP Effects

The visual impacts under the Partial Backfill Alternative would be proportionally less than that described for the Proposed Action, except that the finalization of post-mining reclamation would be delayed for 13 years and it would take longer for the revegetation to mitigate visual impacts. The Partial Backfill Alternative requires that a portion of the waste rock removed during mining

be dumped back into the open pit to the point that would eliminate the potential for a pit lake. The impacts from the Partial Backfill Alternative are essentially the same as the Proposed Action, though generally slightly less due to the smaller WDRFs. However, this is most pronounced from KOP #2 where the reclaimed view (Figure 2.7.3e) does not have the Non-PAG WRDF and a portion of the open pit is covered by backfill.

- **Impact 3.7.3.5-1:** The proposed mining activities would be visible from all five KOPs. The visual impacts would be consistent with VRM Class IV management at KOPs #1, #3, #4, and #5. From KOP #2, which is the only KOP where the Class III management area is visible, the view is not consistent with that management class.

  Significance of the Impact: This impact is considered significant, because of the views from KOP #2. The following mitigation measure would reduce the adverse effects of the impact.

- **Mitigation Measure 3.7.3.5-1:** For reducing visual contrast, minimization of disturbance would be the most effective mitigation technique. Where disturbance is proposed, repetition of the basic landscape elements (form, line, color, and texture) would be implemented to minimize visual change. **In order to lessen long-term visual impacts from the pit wall, treatment may be required to ensure that the final pit wall mimics the surrounding landscape colors as visible from KOP #2. Methods could include, but are not limited to, painting, staining, varnishing, or some other treatment that minimizes the contrast of the visibly exposed and unweathered rock of the pit wall. Any mitigation applications must be pH neutral and contain no caustic or alkaline chemicals to avoid potential adverse environmental impacts. Treatment may occur when the pit wall reaches its final slope configuration. The need for this treatment would be determined by the BLM at that time based on the color of the exposed pit wall surface and its contrast with the surrounding landscape. Specific dimensions and areas of mitigation would be determined by the BLM, based on the actual color of the final pit wall.**

  Clearing of land for WRDFs and facility construction would be done by creating curvilinear boundaries instead of straight lines to minimize disturbance of the landscape. Grading would proceed in a manner that would minimize erosion and conform to the natural topography. Revegetation following recontouring would also reduce visual impacts. The specifics on the final reclamation design implementation would be completed in consultation with interested parties.

- **Effectiveness of Mitigation and Residual Effects:** The effectiveness of this mitigation in reducing the impact to less than significant is not likely; however, given the type and scale of the action this mitigation would be the most effective at limiting the impact.

- **Impact 3.7.3.5-2:** The proposed buildings associated with the Partial Backfill Alternative would be visible from KOP #2 during mining and processing operations, which is not consistent with VRM Class III management.

  Significance of the Impact: This impact is considered significant because of the views from KOP #2. The following mitigation measure would reduce the adverse effects of the impact.

- **Mitigation Measure 3.7.3.5-2:** Visual contrast, associated with the buildings, would be reduced by using construction materials or paints that are earth tones. This would minimize color contrasts with the surrounding landscape.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of this measure would minimize color contrasts within the viewshed and effectively mitigate visual impacts from the buildings. There would be no residual effects from this impact.

3.7.3.5.2 Lighting Effects

The Partial Backfill Alternative would result in unavoidable increases in the amount of light pollution associated with lighting required primarily for safety at the various facilities (processing facility, WRDFs, roads, etc.).

- **Impact 3.7.3.5-3:** The proposed mining activities associated with the Partial Backfill Alternative would increase light pollution in the region.

  Significance of the Impact: This impact is not considered significant; however, the following mitigation measure would reduce the adverse effects of the impact.

- **Mitigation Measure 3.7.3.5-3:** To maintain dark sky conditions, and minimize visual disturbance, facility perimeter lighting, including lighting used to illuminate walkways, roadways, staging areas and parking areas, would be shielded so that the light would be cast in a downward direction. Low-pressure sodium lighting (or an improved technology, if readily available) would be used to reduce or eliminate detrimental lighting impacts and prevent unnecessary light pollution.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of this measure would reduce the effects on the surrounding area and effectively mitigate impacts associated with light pollution in keeping with the objectives of dark sky goals.

The Partial Backfill Alternative would result in unavoidable physical changes in the existing contour and character of the Project Area. The changes would be visibly most apparent over the active life of the Project, but would diminish through the completion of reclamation and revegetation activities contained as part of the Proposed Action. The physical changes to the area would be permanent, but would lessen following the completion of final reclamation as natural processes continue to soften the line and form to match the surrounding landscape.

3.7.3.6 Off-Site Transfer of Ore Concentrate for Processing Alternative

Under this alternative, the open pit, WRDFs, and TSFs would be developed as outlined under the Proposed Action; however, the ore processing facilities would include only the milling operations and production of the molybdenum sulfide concentrate. The TMO and FeMo portions of the processing facility would not be constructed, and as a result, the surface disturbance footprint would be approximately 20 acres less than under the Proposed Action. In addition, the leaching of the concentrate would likely not be done on site. The production of molybdenum sulfide concentrate would occur at an average rate of approximately 45.8 million pounds per year. This material would be stored at the Project Area in a concentrate storage structure adjacent to the mill. The molybdenum sulfide concentrate would be loaded from this storage facility into

street legal haul trucks with covered containers and transported on the public transportation system to either an existing or new TMO facility.

3.7.3.6.1 KOP Effects

The visual impacts under the Off-Site Transfer of Ore Concentrate for Processing Alternative would be essentially the same as those under the Proposed Action. Please refer to Figures 3.7.2 a, b, and c for visual contrasts for existing views and photosimulations showing Year 44 and post-reclamation views. The impacts and mitigation measures outlined for the Proposed Action incorporate the Off-Site Transfer of Ore Concentrate for Processing Alternative.

- **Impact 3.7.3.6-1:** The proposed mining activities would be visible from all five KOPs. The visual impacts would be consistent with VRM Class IV management at KOPs #1, #3, #4, and #5. From KOP #2, which is the only KOP where the Class III management area is visible, the view is not consistent with that management class.

  Significance of the Impact: This impact is considered significant, because of the views from KOP #2. The following mitigation measure would reduce the adverse effects of the impact.

- **Mitigation Measure 3.7.3.6-1:** For reducing visual contrast, minimization of disturbance would be the most effective mitigation technique. Where disturbance is proposed, repetition of the basic landscape elements (form, line, color, and texture) would be implemented to minimize visual change. **In order to lessen long-term visual impacts from the pit wall, treatment may be required to ensure that the final pit wall mimics the surrounding landscape colors as visible from KOP #2. Methods could include, but are not limited to, painting, staining, varnishing, or some other treatment that minimizes the contrast of the visibly exposed and unweathered rock of the pit wall. Any mitigation applications must be pH neutral and contain no caustic or alkaline chemicals to avoid potential adverse environmental impacts. Treatment may occur when the pit wall reaches its final slope configuration. The need for this treatment would be determined by the BLM at that time based on the color of the exposed pit wall surface and its contrast with the surrounding landscape. Specific dimensions and areas of mitigation would be determined by the BLM, based on the actual color of the final pit wall.**

  Clearing of land for WRDFs and facility construction would be done by creating curvilinear boundaries instead of straight lines to minimize disturbance of the landscape. Grading would proceed in a manner that would minimize erosion and conform to the natural topography. Revegetation following recontouring would also reduce visual impacts. The specifics on the final reclamation design implementation would be completed in consultation with interested parties.

- **Effectiveness of Mitigation and Residual Effects:** The effectiveness of this mitigation in reducing the impact to less than significant is not likely; however, given the type and scale of the action this mitigation would be the most effective at limiting the impact.

- **Impact 3.7.3.6-2:** The proposed buildings associated with the Off-Site Transfer of Ore Concentrate for Processing Alternative would be visible from KOP #2 during mining and processing, which is not consistent with VRM Class III management.

  Significance of the Impact: This impact is considered significant because of the views from KOP #2. The following mitigation measure would reduce the adverse effects of the impact.

- **Mitigation Measure 3.7.3.6-2:** Visual contrast, associated with the buildings, would be reduced by using construction materials or paints that are earth tones. This would minimize color contrasts with the surrounding landscape.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of this measure would minimize color contrasts within the viewshed and effectively mitigate visual impacts from the buildings. There would be no residual effects from this impact.

3.7.3.6.2 Lighting Effects

The Partial Backfill Alternative would result in unavoidable increases in the amount of light pollution associated with lighting required primarily for safety at the various facilities (processing facility, WRDFs, roads, etc.).

- **Impact 3.7.3.6-3:** The proposed mining activities associated with the Off-Site Transfer of Ore Concentrate for Processing Alternative would increase light pollution in the region.

  Significance of the Impact: This impact is not considered significant; however, the following mitigation measure would reduce the adverse effects of the impact.

- **Mitigation Measure 3.7.3.6-3:** To maintain dark sky conditions, and minimize visual disturbance, facility perimeter lighting, including lighting used to illuminate walkways, roadways, staging areas and parking areas, would be shielded so that the light would be cast in a downward direction. Low-pressure sodium lighting (or an improved technology, if readily available) would be used to reduce or eliminate detrimental lighting impacts and prevent unnecessary light pollution.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of this measure would reduce the effects on the surrounding area and effectively mitigate impacts associated with light pollution in keeping with the objectives of dark sky goals.

The Off-Site Transfer of Ore Concentrate for Processing Alternative would result in unavoidable physical change in the existing contour and character of the Project Area. The changes would be visibly most apparent over the active life of the Project, but would diminish through the completion of reclamation and revegetation activities contained as part of the Proposed Action. The physical changes to the area would be permanent, but would lessen following the completion of final reclamation as natural processes continue to soften the line and form to match the surrounding landscape.

3.7.3.7 Slower, Longer Project Alternative

Under this alternative, the open pit, WRDFs, TSFs, and processing facilities would be developed as outlined under the Proposed Action; however, the overall Project would occur at half the rate of the Proposed Action and take twice as long to complete.

3.7.3.7.1 KOP Effects

The visual impacts under the Slower, Longer Project Alternative would be essentially the same as those under the Proposed Action; however, those impacts would occur over a different and longer time frame. Please refer to Figures 3.7.2 a, b, and c for visual contrasts for existing views and photosimulations showing what would be Year 88 and post-reclamation views. The impacts and mitigation measures outlined for the Proposed Action incorporate the Slower, Longer Project Alternative.

- **Impact 3.7.3.7-1:** The proposed mining activities would be visible from all five KOPs. The visual impacts would be consistent with VRM Class IV management at KOPs #1, #3, #4, and #5. From KOP #2, which is the only KOP where the Class III management area is visible, the view is not consistent with that management class.

  Significance of the Impact: This impact is considered significant, because of the views from KOP #2. The following mitigation measure would reduce the adverse effects of the impact.

- **Mitigation Measure 3.7.3.7-1:** For reducing visual contrast, minimization of disturbance would be the most effective mitigation technique. Where disturbance is proposed, repetition of the basic landscape elements (form, line, color, and texture) would be implemented to minimize visual change. **In order to lessen long-term visual impacts from the pit wall, treatment may be required to ensure that the final pit wall mimics the surrounding landscape colors as visible from KOP #2. Methods could include, but are not limited to, painting, staining, varnishing, or some other treatment that minimizes the contrast of the visibly exposed and unweathered rock of the pit wall. Any mitigation applications must be pH neutral and contain no caustic or alkaline chemicals to avoid potential adverse environmental impacts. Treatment may occur when the pit wall reaches its final slope configuration. The need for this treatment would be determined by the BLM at that time based on the color of the exposed pit wall surface and its contrast with the surrounding landscape. Specific dimensions and areas of mitigation would be determined by the BLM, based on the actual color of the final pit wall.**

  Clearing of land for WRDFs and facility construction would be done by creating curvilinear boundaries instead of straight lines to minimize disturbance of the landscape. Grading would proceed in a manner that would minimize erosion and conform to the natural topography. Revegetation following recontouring would also reduce visual impacts. The specifics on the final reclamation design implementation would be completed in consultation with interested parties.

- **Effectiveness of Mitigation and Residual Effects:** The effectiveness of this mitigation in reducing the impact to less than significant is not likely; however, given the type and

scale of the action this mitigation would be the most effective at limiting the impact. The Slower, Longer Project Alternative would result in unavoidable physical change in the existing contour and character of the Project Area. The changes would be visibly most apparent over the active life of the Project, but would diminish through the completion of reclamation and revegetation activities contained as part of the Slower, Longer Project Alternative. The physical changes to the area would be permanent, but would lessen following the completion of final reclamation as natural processes continue to soften the line and form to match the surrounding landscape.

- **Impact 3.7.3.7-2:** The proposed buildings associated with the Slower, Longer Project Alternative would be visible from KOP #2, which is not consistent with VRM Class III management.

  Significance of the Impact: This impact is considered significant because of the views from KOP #2 during mining and process operations. The following mitigation measure would reduce the adverse effects of the impact.

- **Mitigation Measure 3.7.3.7-2:** Visual contrast, associated with the buildings, would be reduced by using construction materials or paints that are earth tones. This would minimize color contrasts with the surrounding landscape.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of this measure would minimize color contrasts within the viewshed and effectively mitigate visual impacts from the buildings. There would be no residual effects from this impact.

3.7.3.7.2 Lighting Effects

The Slower, Longer Project Alternative would result in unavoidable increases in the amount of light pollution associated with lighting required primarily for safety at the various facilities (processing facility, WRDFs, roads, etc.).

- **Impact 3.7.3.7-3:** The proposed mining activities associated with the Off-Site Transfer of Ore Concentrate for Processing Alternative would increase light pollution in the region.

  Significance of the Impact: This impact is not considered significant; however, the following mitigation measure would reduce the adverse effects of the impact.

- **Mitigation Measure 3.7.3.7-3:** To maintain dark sky conditions, and minimize visual disturbance, facility perimeter lighting, including lighting used to illuminate walkways, roadways, staging areas and parking areas, would be shielded so that the light would be cast in a downward direction. Low-pressure sodium lighting (or an improved technology, if readily available) would be used to reduce or eliminate detrimental lighting impacts and prevent unnecessary light pollution.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of this measure would reduce the effects on the surrounding area and effectively mitigate impacts associated with light pollution in keeping with the objectives of dark sky goals.

3.8 Soil Resources

The soils resources section identifies the existing soil characteristics in the approximately **22,886-**acre Project Area, which includes the proposed open pit mine facility area, powerline corridor, and well field development area. This section also describes the potential impacts of the Proposed Action and alternatives on the soil resources within the Project Area, as well as mitigation measures to reduce these impacts.

3.8.1 Regulatory Framework

The laws, regulations, guidelines, and procedures that apply to management of soil resources potentially affected by the Proposed Action include the following:

3.8.1.1 Bureau of Land Management, 43CFR Part 3800

Under 43 CFR Part 3800, the BLM has defined its final rule regarding Mining Claims Under the General Mining Laws; Surface Management to include performance standards that govern the operation and reclamation of surface mining projects. Section 3809.420(6)(b)(3) stipulates that the operator must initiate reclamation at the earliest feasible time and that reclamation shall include, but not be limited to: "(A) Saving of topsoil for final application after reshaping of disturbed areas have been completed; (B) Measures to control erosion, landslides, and water runoff; (C) Measures to isolate, remove, or control toxic materials; [and] (D) Reshaping the area disturbed, application of the topsoil, and revegetation of disturbed areas, where reasonably practicable..." When reclamation has been completed, the authorized officer shall be notified such that an inspection of the reclaimed areas can be made.

3.8.1.2 Nevada Revised Statutes Chapter 519A: Reclamation of Lands Subject to Mining Operations of Exploration Projects

The Project is subject to the reclamation requirements under NRS 519A.200 and NRS 519A.210, which state that "A person shall not engage in a mining operation without a valid permit for that purpose issued by the Division [of Environmental Protection]" and that "A person who desires to engage in a mining operation must...agree in writing to assume the responsibility for the reclamation of any land damaged as a result of the mining operation." These statutes are enforced by NAC519A.325 and .330 which require the removal and stockpiling of topsoil and revegetation of the land. NAC519A.255 states that reclamation is not required beyond that approved by federal agency (i.e., the BLM).

3.8.1.3 Nevada Best Management Practices

The use of BMPs in Nevada is addressed in the Handbook of Best Management Practices published by the Nevada Division of Environmental Protection and the Nevada Division of Conservation Districts (1994). The handbook references two definitions of BMPs. EPA guidelines define BMPs as "methods, measures, or practices to prevent or reduce water pollution, including but not limited to, structural and non-structural controls, operation and maintenance procedures, and scheduling and distribution of activities. Usually BMPs are applied as a system of practices rather than a single practice. BMPs are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility." NAC 445A.306 defines "Best Practices" as "measures, methods of

operation or practice that are reasonably designed to prevent, eliminate, or reduce water pollution from diffuse sources and that are consistent with the best practices in the particular field under the conditions applicable. This term is intended to be equivalent to the term 'best management practices' as used in federal statutes and regulations."

3.8.2 Affected Environment

3.8.2.1 Study Methods

The term "soil", as used in this EIS, is defined as a natural body consisting of layers or horizons of minerals or organic matter of variable thickness, which differ from their parent material in their morphological, physical, chemical, and mineralogical properties as well as their biological characteristics. Topography, or local relief, controls much of the distribution of soils in the landscape to such an extent that soils of markedly contrasting morphologies and properties can merge laterally with one another and yet be in equilibrium under existing local conditions (Birkeland 1999).

The USDA NRCS was the primary source of information regarding soil resources within the Project Area. Digital soil survey maps from the Soil Survey Geographic Database (SSURGO) for the Diamond Valley and Eureka County Soil Survey Areas were compared to the Project boundary using GIS. A soil survey report was generated for the soil associations and complexes found within the Project Area. The report includes a description of physical soil characteristics, soil formation descriptions, and qualitative ratings for various soil use and management properties. The NRCS analyses of erodibility hazard potential and potential for use during reclamation activities as fill material and replacement topsoil has been incorporated as part of the evaluation of soil resources within the Project Area. Within the area of the potential water table drawdown in Kobeh Valley, soil erodibility has been assessed by looking at potential changes to the vegetation community.

Soil erodibility hazard potential has been assessed for both water driven and wind driven erosional causes on each soil unit within the Project Area. Erodibility ratings are based on analyzing the dominant conditions of the surface layer of each soil within a soil unit. Water driven causes have been qualified based on the NRCS K factor. The erosion K factor indicates the susceptibility of a soil to sheet and rill erosion by water, based primarily on the percentage of silt, sand, organic matter, and rock fragments within the soil unit and on soil structure and saturated hydraulic conductivity. Values of K range from 0.02 to 0.64 and have been qualified as being "slight" for K factor values between 0.02 and 0.17, "moderate" for values between 0.20 and 0.37, and "severe" for values between 0.43 and 0.64. Wind driven erosional causes have similarly been qualified based on NRCS wind erodibility group (WEG) ratings. WEG ratings range from 1 to 8 with values of 1 and 2 considered "severe", values from 3 to 6 considered "moderate", and values 7 and 8 considered "slight". The WEG value is closely correlated to the texture of the surface layer, the size and durability of surface clods, rock fragments, and organic matter, and the calcareous reaction potential of the soil. Soil moisture and frozen soil layers also influence WEG ratings **(NRCS 2012a)**.

NRCS ratings have been assigned to soils for their potential use as reclamation fill material based on soil properties that affect erosion and stability of the surface layer and the productive potential of the reclaimed soil. These properties include the sodium, salt, and $CaCO_3$ content of the soils, soil reaction (i.e., pH balance), available water capacity, erodibility, texture, rock

content, organic matter content, and other characteristics that affect fertility. Soils are rated "good", "fair", or "poor" based on the amount of suitable fill material available, the ease of excavation, and the performance of the material after it has been replaced. "Good" ratings reflect soils that are well suited for use as fill material, and the establishment of vegetation is relatively easy. "Good" soils are relatively stable, resist erosion, and have good productive potential. "Fair" soils possess certain soil properties that would need to be improved or supplemented to provide suitable fill material that promotes vegetative productivity. "Poor" soils would require difficult and costly improvements in order to provide suitable fill material during reclamation activities **(NRCS 2012a)**.

The NRCS has also assigned "good", "fair", and "poor" ratings to soils based on their potential use as reclamation topsoil. These soil ratings reflect the soil properties that promote plant growth and the ease of removing, loading, and spreading the material. Typically, soils that have been rated "good" contain more organic matter that improves the absorption and retention of water and nutrients, have sufficient depth to provide an adequate amount of material, and contain fewer rock fragments that would interfere with soil removal and spreading than soils rated "fair" or "poor" **(NRCS 2012a)**.

3.8.2.2 Existing Conditions

The Project Area and cumulative effects study area (CESA) are located within the Central Nevada Basin and Range Major Land Resource Area (MLRA) (NRCS 2006). The Central Nevada Basin and Range MLRA is in the Great Basin Section of the Basin and Range geologic province. This area is dominated by nearly level, aggraded desert basins and valleys between series of north south mountain ranges. Locally, the Project Area lies in the southeastern corner of the Roberts Mountain between Kobeh Valley and Diamond Valley in Eureka County, Nevada. The Project Area is centered around Mount Hope, which forms the southern end of the Garden Valley, a subbasin of Pine Valley, and extends to the south and southwest into the Kobeh Valley.

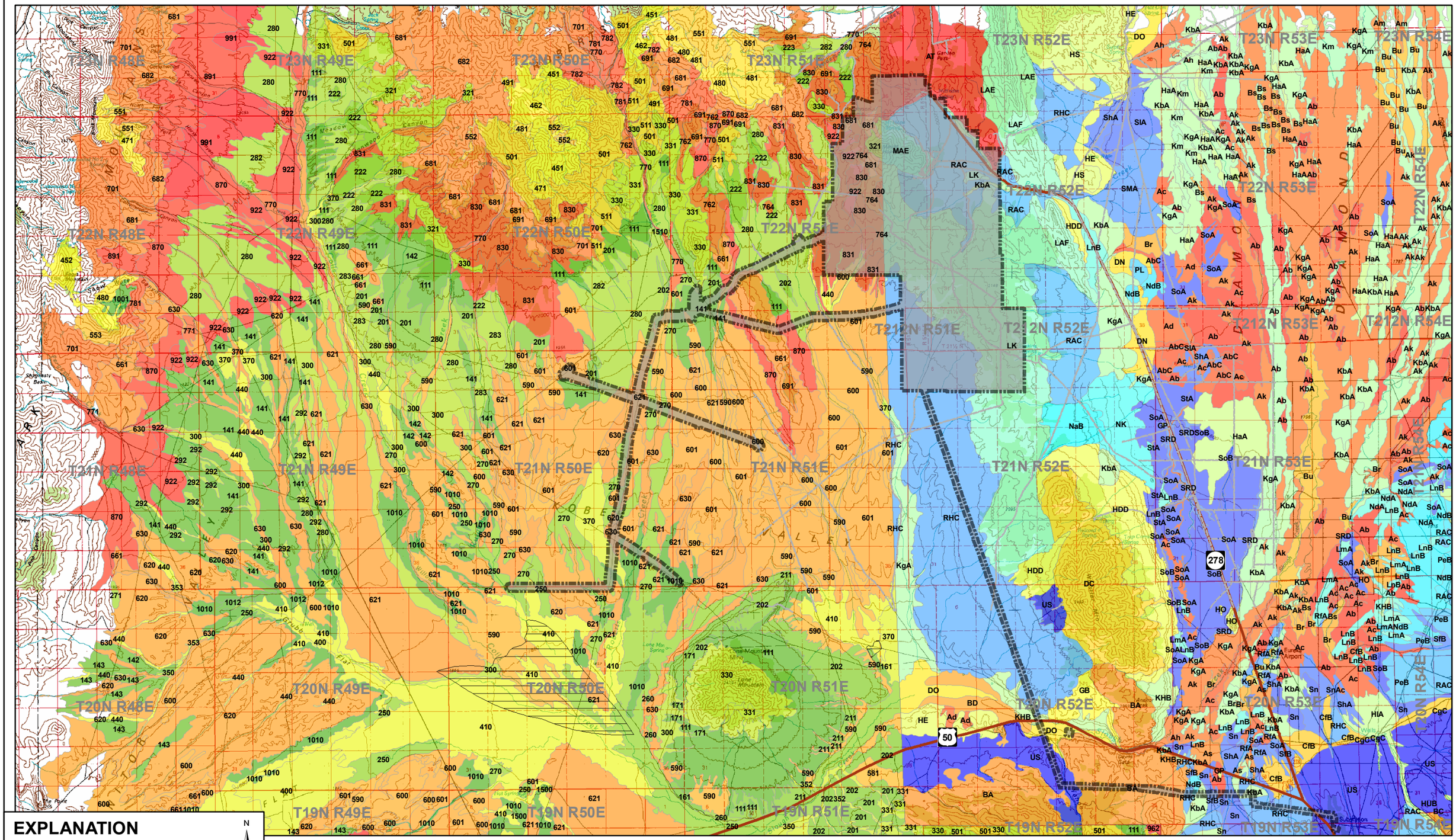
Forty-six soil units were identified within the Project Area from the SSURGO database analysis (Table 3.8-1, Figure 3.8.1). These soil units were mapped in the Diamond Valley and Eureka County Soil Mapping Areas.

Table 3.8-1: Soils in the Project Area

Soil Mapping Unit Symbol	Soil Association or Complex Name	Acreage within the Project Area
Ab	Alhambra fine sandy loam	9.9
AT	Atrypa association	814.5
BA	Bartine-Overland association	214.6
DO	Dianev silty clay loam	44.9
KbA	Kobeh sandy loam	235.2
KHB	Kobeh gravelly fine sandy loam	25.6
LK	Labshaft-Rock outcrop complex	6,815.3
MAE	Mau stony loam	775.7
NdB	Nayped loam	7.5

Soil Mapping Unit Symbol	Soil Association or Complex Name	Acreage within the Project Area
RAC	Ratto gravelly fine sandy loam	3,054.6
RHC	Rubyhill fine sandy loam	**3,138.1**
SfB	Shipley fine sandy loam	**22.5**
ShA	Shipley silt loam	**10.9**
Sn	Shipley complex	**18.0**
US	Umil association	**194.0**
141	Pedoli-Poorcal association	3**20.6**
201	Umil loam	4**9.2**
202	Umil-Hayeston association	19.3
250	Dianev silt loam	105.4
270	Poorcal loam	3**40.8**
280	Coils loam	**544.7**
321	Mau-Shagnasty-Eightmile association	159.9
330	Hopeka-Solak-Ados association	**1.1**
370	Kobeh gravelly loam	72.1
410	Beanflat silt loam	29.7
440	Akercan loam	133.0
590	Hayeston sandy loam	**239.5**
600	Rubyhill sandy loam	3**07.9**
601	Rubyhill-Barrier association	**909.2**
620	Silverado sandy loam	23.2
621	Silverado sandy loam	316.**5**
630	Jesse Camp silt loam	1**44.3**
661	Akerue-Simpark-Robson association	17**4.7**
681	Chad-Cleavage-Softscrabble association	269.8
764	Shagnasty-Ravenswood-Rock outcrop association	326.5
830	Atrypa gravelly loam	1,52**6.4**
831	Atrypa-Mau association	857.**8**
870	Fortank very stony loam	113.8
922	Handy loam	35**4.1**
1010	Bubus loam	164.7
Total		2**2,885.6**

Shaded rows denote mapping units that occur in the Diamond Valley Area, including portions of Eureka, Elko, and White Pine Counties. All other mapping units occur in the Eureka County Area.



EXPLANATION

- Project Boundary
- Unpaved Road
- Eureka County Area Soil Associations
- Diamond Valley Area Soil Associations
- Phreatophytes within the 10-Foot Drawdown

N

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BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Soil Mapping Units within the Project Area

Figure 3.8.1

The soils in the mountainous central part of the Project Area are typically very stony to very gravelly loams found on eight to 50 percent slopes intermixed with rocky outcrops. These soils are shallow to moderately deep over lithic and paralithic bedrock and derive from residuum and colluvium from mixed igneous, metamorphic, and volcanic rocks. Soils found in the hilly terrain surrounding Mount Hope are on slopes ranging from four to 30 percent and derive from volcanic rocks and limestone.

The Project Area extends south and southwest as the topography transitions into the Kobeh Valley. Soils are found on alluvial fans, inset fans, fan pediments, skirts, and remnants as the terrain becomes more gentle and slopes decrease to eight percent or less. These soils are moderately deep to deep over duripan and derive from alluvium from mixed igneous, sedimentary, and volcanic rocks and ash. Soil texture becomes more fine as gravelly loams give way to fine sandy and silty loams. Soils found in the basins and basin floors within the Project Area are deep and derive from alluvium from mixed rocks and volcanic ash.

Soil unit composition and physical characteristics are detailed in Table 3.8-2. The NRCS surface soil erodibility ratings for the soils within the Project Area are shown on Figure 3.8.2 and the NRCS ratings for soil use potential as reclamation fill material and topsoil are portrayed in Figure 3.8.3. These erodibility hazard ratings and soil use ratings were derived from the analysis of various physical soil properties and characteristics that promote ease of use, stability, and revegetative success described in Section 3.8.2.1.

Approximately 93.1 percent of the soils within the Project Area are rated “moderate” to “slight / moderate” for both wind and water driven erosion potential. A small percentage of the soils within the Project Area (approximately 4.3 percent) have a “severe” soil erodibility hazard rating for water caused erosion. These soils are located in the northern, western, and southern segments of the well field development area and the southern portion of the powerline corridor. Soils that have “slight” erodibility ratings are found on the western and southwestern slopes of Mount Hope and the eastern segments of the well field development area. These soils make up approximately 2.6 percent of the Project Area (Figure 3.8.2).

The majority of the Project Area is centered on Mount Hope and the surrounding foothills and pediments. The soils in these areas, making up approximately 72 percent of the Project Area, are considered “poor” for use as either reclamation fill material or topsoil. Scattered portions of the powerline corridor and well field areas extending south and southwest into the Kobeh Valley consist of soils that are rated “fair” for use as fill material. Soils in the powerline corridor are also considered “fair” for use as topsoil; however, only two percent of the Project Area, located in the northern and western segments of the well field area, contain soils that are rated “good” for use as topsoil (Figure 3.8.3).

In general, the soils within the Project Area would require moderate to substantial improvements for use as either fill material or topsoil that would promote optimal vegetative productivity. The consequences of weather and climate change on soils can be subtle and complex. The projected changes in climate – increases in temperature, reductions in soil moisture, and more intense rainfall events – may affect erosion, ability of soils to sequester carbon, impacts to soil moisture, and fugitive dust concentrations.

3.8.3 Environmental Consequences and Mitigation Measures

Potential issues related to soil resources within the Project Area as a result of the Proposed Action and alternatives include the following:

- Potential erosional impacts or loss of physical soil stability;
- Availability of suitable soils and growth media for reclamation;
- Potential for alteration in soil chemical stability; and
- Potential for successfully reclaiming mine-related disturbance.

3.8.3.1 Significance Criteria

Environmental impacts to soils would be significant if the Proposed Action or other alternatives resulted in any of the following:

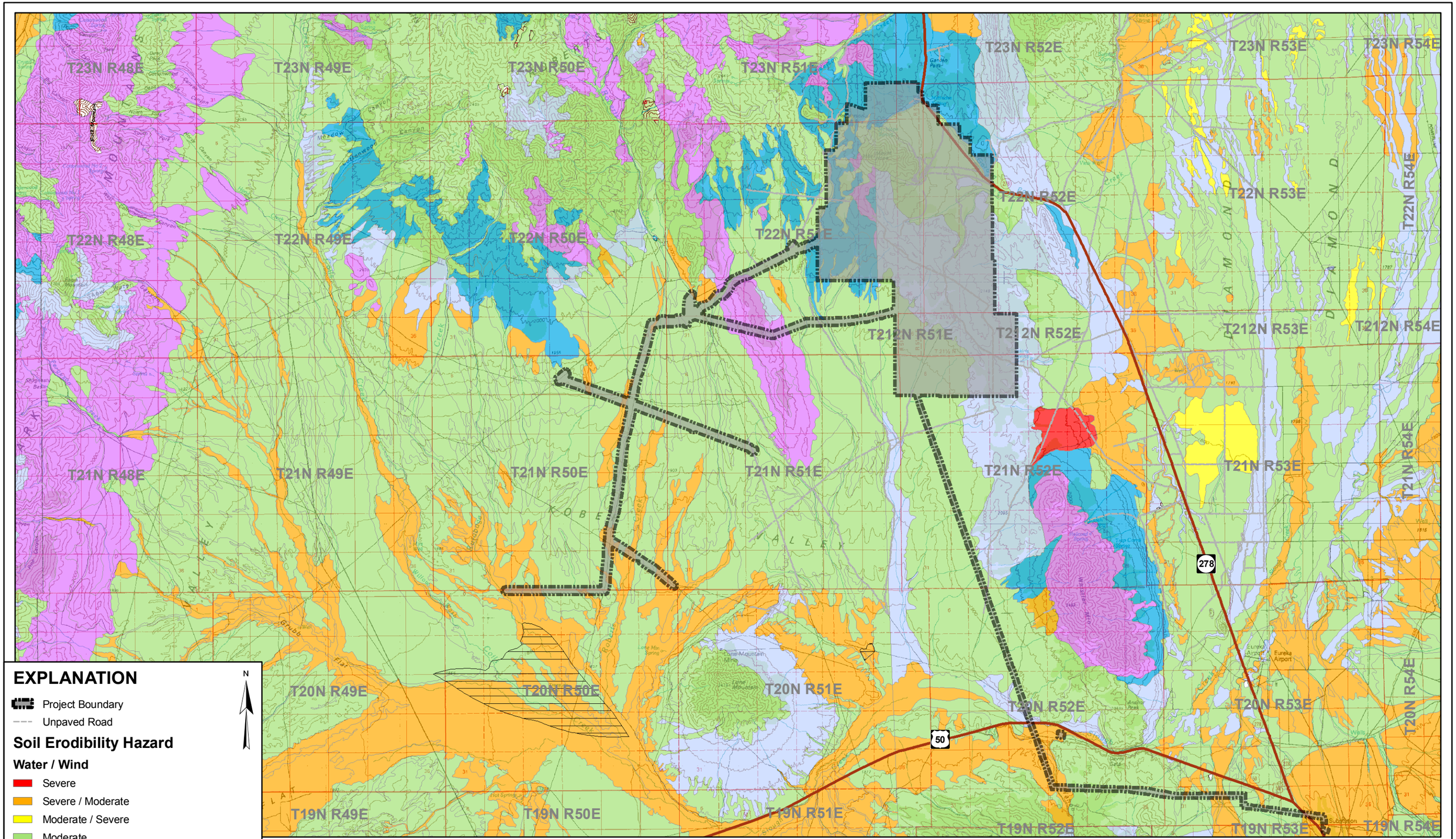
- Accelerated erosion in excess of soil loss tolerances on waste rock, pit slope, or stockpile facilities or other sloped surfaces;
- Substantial decrease in downstream water resource quality from erosion and sedimentation;
- Substantial decrease in the amount of overall site productivity from pre-mining to post-mining land uses;
- Compromised public safety through mass instabilities on slopes or fills, or inadequate closure procedures; and
- Loss of growth media during stockpiling or reclamation that would limit revegetation success.

3.8.3.2 Assessment Methodology

Soils were assessed for erosion potential and for potential use as reclamation fill material and topsoil based on the NRCS ratings provided in the SSURGO database or a change in the vegetation community due to a decline in the water table. The analysis criteria that were used to determine these ratings are described above in Study Methods, Section 3.8.2.1. The environmental consequences and impacts described in the following sections are based on these ratings.

3.8.3.3 Proposed Action

Direct impacts to soil resources within the Project Area would result from the disturbance of 8,3**55** acres under the Proposed Action. Many of the proposed facilities, such as the open pit, WRDFs, LGO stockpile, TSFs, and interpit area, would become permanent topographical features within the Project Area upon completion of the Project. Reclamation activities would include replacing growth media over the stabilized surface of these features prior to revegetation efforts. Growth media would be provided by salvaging and stockpiling the existing soil resources within the Project Area prior to the construction of Project facilities.



EXPLANATION

N

- Project Boundary
- Unpaved Road

Soil Erodibility Hazard

Water / Wind

- Severe
- Severe / Moderate
- Moderate / Severe
- Moderate
- Moderate / Slight
- Slight / Moderate
- Slight
- Not Rated
- Phreatophytes within the 10-Foot Drawdown

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MOUNT HOPE PROJECT

DRAWING TITLE:

Soil Erodibility Hazard in the Project Vicinity

Figure 3.8.2

EXPLANATION

- Project Boundary
- Unpaved Road

Soil Use Potential

Topsoil / Fill Material

- Good / Fair
- Good / Poor
- Fair
- Fair / Poor
- Poor / Fair
- Poor
- Not Rated

N

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BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Potential for Soil Use as Reclamation Fill Material and Topsoil in the Project Vicinity

Figure 3.8.3

Table 3.8-2: Summary of Soil Mapping Units and Characteristics

Mapping Unit	Soil Series	Soil Depth in Inches (Restrictive Feature)	Hydrological Characteristics	Soil Erodibility Hazard	
				By Water	By Wind
Alhambra fine sandy loam (Ab)	Alhambra (100%)	60+ (unknown)	Well drained; high permeability; rarely flooded.	Moderate	Moderate
Atrypa association (AT)	Atrypa (60%)	10 - 20 (paralithic bedrock)	Well drained; moderately high permeability.	Moderate	Slight
	Atrypa (30%)	10 - 20 (paralithic bedrock)	Well drained; moderately high permeability.		
Bartine-Overland association (BA)	Bartine (40%)	20 - 40 (lithic bedrock)	Well drained; moderately high permeability.	Moderate	Moderate
	Overland (40%)	20 - 40 (lithic bedrock)	Well drained; moderately high permeability.		
Dianev silty clay loam (DO)	Dianev (95%)	60+ (unknown)	Somewhat poorly drained, moderately low permeability; rarely flooded; seasonal zone of water saturation March-June.	Severe	Moderate
Kobeh sandy loam (KbA)	Kobeh (100%)	60+ (unknown)	Somewhat excessively drained; high permeability.	Moderate	Moderate
Kobeh gravelly fine sandy loam (KHB)	Kobeh (100%)	60+ (unknown)	Somewhat excessively drained; high permeability.	Slight	Moderate
Labshaft-Rock outcrop complex (LK)	Labshaft (75%)	10 - 20 (lithic bedrock)	Well drained; moderately high permeability.	Slight	Moderate
	Rock outcrop (15%)	0	N/A		
Mau stony loam (MAE)	Mau (100%)	20 - 40 (lithic bedrock)	Well drained; moderately low permeability.	Moderate	Moderate
Nayped loam (NdB)	Nayped (100%)	60+	Well drained; moderately high permeability.	Severe	Moderate
Ratto gravelly fine sandy loam (RAC)	Ratto (100%)	12 - 20 (duripan)	Well drained; moderately low permeability.	Moderate	Moderate
Rubyhill fine sandy loam (RHC)	Rubyhill (100%)	20 - 30 (duripan)	Well drained; moderately high permeability.	Moderate	Moderate
Shipley fine sandy loam (SfB)	Shipley (100%)	60+ (unknown)	Well drained; moderately high permeability.	Moderate	Moderate
Shipley silt loam (ShA)	Shipley (100%)	60+ (unknown)	Well drained; moderately high permeability; rarely flooded.	Severe	Moderate
Shipley complex (Sn)	Shipley variant (60%)	60+ (unknown)	Well drained; moderately high permeability; rarely flooded.	Severe	Moderate
	Shipley (30%)	60+ (unknown)	Well drained; moderately high permeability; rarely flooded.		

Mapping Unit	Soil Series	Soil Depth in Inches (Restrictive Feature)	Hydrological Characteristics	Soil Erodibility Hazard	
				By Water	By Wind
Umil association (US)	Umil (60%)	7 - 14 (duripan)	Well drained; moderately high permeability.	Severe	Moderate
	Umil (30%)	7 - 14 (duripan)	Well drained; moderately high permeability.		
Lien-Hayeston association (111)	Lien (40%)	6 - 14 (duripan)	Well drained, high permeability.	Slight	Moderate
	Lein (30%)	6 - 14 (duripan)	Well drained; high permeability.		
	Hayeston (15%)	60+ (unknown)	Well drained; high permeability; rarely flooded.		
Pedoli-Poorcal association (141)	Pedoli (65%)	60+ (unknown)	Well drained; moderately high permeability.	Moderate	Moderate
	Poorcal (20%)	60+ (unknown)	Well drained; moderately high permeability.		
Pedoli-Shipley association (142)	Pedoli (80%)	60+ (unknown)	Well drained; moderately high permeability.	Moderate	Moderate
	Shipley (15%)	60+ (unknown)	Well drained; moderately high permeability; occasionally flooded.		
Umil loam (201)	Umil (100%)	7 - 14 (duripan)	Well drained; moderately high permeability.	Severe	Moderate
Umil-Hayeston association (202)	Umil (70%)	7 - 14 (duripan)	Well drained; moderately high permeability.	Severe	Moderate
	Hayeston (20%)	60+ (unknown)	Well drained; high permeability; rarely flooded.		
Dianev silt loam (250)	Dianev (95%)	60+ (unknown)	Somewhat poorly drained; moderately low permeability; occasionally flooded; seasonal zone of water saturation March-June.	Severe	Moderate
Poorcal loam (270)	Poorcal (100%)	60+ (unknown)	Well drained; moderately high permeability.	Moderate	Moderate
Coils loam (280)	Coils (100%)	20 - 40 (duripan)	Well drained; moderately low permeability.	Moderate	Moderate
Coils-Umil association (283)	Coils (50%)	20 - 40 (duripan)	Well drained; moderately low permeability.	Moderate	Moderate
	Umil (40%)	7 - 14 (duripan)	Well drained; moderately high permeability.		
Rutab loam (300)	Rutab (100%)	60+ (unknown)	Well drained; moderately high permeability.	Moderate	Moderate
Mau-Shagnasty-Eightmile association (321)	Mau (45%)	20 - 40 (lithic bedrock)	Well drained; moderately low permeability.	Moderate	Moderate
	Shagnasty (30%)	50 - 60 (paralithic bedrock)	Well drained; moderately low permeability.		

Mapping Unit	Soil Series	Soil Depth in Inches (Restrictive Feature)	Hydrological Characteristics	Soil Erodibility Hazard	
				By Water	By Wind
	Eightmile (15%)	6 - 14 (paralithic bedrock)	Well drained; moderately high permeability.		
Hopeka-Solak-Ados association (330)	Hopeka (45%)	4 - 10 (lithic bedrock)	Well drained; moderately high permeability.	Moderate	Moderate
	Solak (25%)	10 - 20 (lithic bedrock)	Somewhat excessively drained; moderately high permeability.		
	Ados (15%)	30 - 40 (lithic bedrock)	Well drained; moderately high permeability.		
Hopeka-Solak-Rock outcrop association (331)	Hopeka (40%)	4 - 10 (lithic bedrock)	Well drained; moderately high permeability.	Moderate	Moderate
	Solak (35%)	10 - 20 (lithic bedrock)	Somewhat excessively drained; moderately high permeability.		
	Rock outcrop (10%)	0	N/A		
Kobeh gravelly loam (370)	Kobeh (100%)	60+ (unknown)	Somewhat excessively drained; moderately high permeability.	Moderate	Moderate
Beanflat silt loam (410)	Beanflat (100%)	60+ (unknown)	Somewhat poorly drained; moderately high permeability; occasionally flooded; seasonal zone of water saturation December-May.	Severe	Moderate
Akercan loam (440)	Akercan (100%)	60+ (unknown)	Well drained; moderately high permeability.	Moderate	Moderate
Hayeston sandy loam (590)	Hayeston (100%)	60+ (unknown)	Well drained; high permeability; rarely flooded.	Moderate	Moderate
Rubyhill sandy loam (600)	Rubyhill (100%)	20 - 30 (duripan)	Well drained; moderately high permeability.	Moderate	Moderate
Rubyhill-Barrier association (601)	Rubyhill (60%)	20 - 30 (duripan)	Well drained; moderately high permeability.	Moderate	Moderate
	Barrier (25%)	10 - 20 (duripan)	Well drained; moderately high permeability.		
Silverado sandy loam (620)	Silverado (100%)	60+ (unknown)	Well drained; high permeability.	Moderate	Moderate
Silverado sandy loam (621)	Silverado (100%)	60+ (unknown)	Well drained; high permeability.	Moderate	Moderate
Jesse Camp silt loam (630)	Jesse Camp (100%)	60+ (unknown)	Well drained; moderately high permeability; rarely flooded.	Severe	Moderate
Akerue-Simpark-Robson association (661)	Akerue (40%)	15 - 26 (lithic bedrock)	Well drained; moderately low permeability.	Slight	Slight
	Simpark (35%)	20 - 30 (lithic bedrock)	Well drained; moderately high permeability.		
	Robson (10%)	12 - 20 (lithic bedrock)	Well drained; moderately low permeability.		

Mapping Unit	Soil Series	Soil Depth in Inches (Restrictive Feature)	Hydrological Characteristics	Soil Erodibility Hazard	
				By Water	By Wind
Chad-Cleavage-Softscrabble association (681)	Chad (45%)	40 - 60 (paralithic bedrock)	Well drained; moderately low permeability.	Moderate	Moderate
	Cleavage (20%)	14 - 20 (lithic bedrock)	Well drained; moderately high permeability.		
	Softscrabble (20%)	60+ (unknown)	Well drained; moderately low permeability.		
Shagnasty-Ravenswood-Rock outcrop association (764)	Shagnasty (45%)	50 - 60 (paralithic bedrock)	Well drained; moderately low permeability.	Slight	Slight
	Ravenswood (25%)	30 - 40 (lithic bedrock)	Well drained; moderately low permeability.		
	Rock outcrop (15%)	0	N/A		
Welch loam (770)	Welch (95%)	60+ (unknown)	Well drained; moderately high permeability; occasionally flooded; seasonal zone of water saturation February-May.	Moderate	Moderate
Atrypa gravelly loam (830)	Atrypa (100%)	10 - 20 (paralithic bedrock)	Well drained; moderately high permeability.	Moderate	Slight
Atrypa-Mau association (831)	Atrypa (75%)	10 - 20 (paralithic bedrock)	Well drained; moderately high permeability.	Moderate	Slight
	Mau (15%)	20 - 40 (lithic bedrock)	Well drained; moderately low permeability.		
Fortank very stony loam (870)	Fortank (100%)	30 - 40 (paralithic bedrock)	Well drained; moderately low permeability.	Slight	Slight
Handy loam (922)	Handy (100%)	60+ (unknown)	Well drained; moderately low permeability.	Moderate	Moderate
Bubus loam (1010)	Bubus (100%)	60+ (unknown)	Well drained; moderately high permeability.	Severe	Moderate

Shaded rows denote mapping units that occur in the Diamond Valley Area, including portions of Eureka, Elko, and White Pine Counties. All other mapping units occur in the Eureka County Area.

Up to 21 million yd^3 of soil material could be salvaged from the disturbance footprint of Project facilities and stockpiled for use as interim and final reclamation cover material and growth media. Soil would be stripped from targeted soil units based on analyses of the NRCS soil mapping database and previous and proposed field testing. Salvaged soils would be stockpiled and designated as strictly organic, inorganic, or a mixture of both. Organic soils would be used as growth media topsoils, while the inorganic material would be stockpiled for use as cover material. Organic and inorganic growth media may be mixed if sufficient amounts of inorganic material are stockpiled for use as engineered cover. Soil and growth media stockpiles would have a higher erosion potential than the natural environment due to the potential for decreased soil compaction, increased slope gradients, and the loss of stabilizing vegetation cover. Growth

media stockpiles would be stabilized and revegetated following the removal of material for the reclamation of other facilities during final reclamation activities.

Soil erosion potential for other areas of disturbance within the Project Area would also be higher than the natural environment. The construction of sloped facilities, such as the WRDFs, LGO Stockpile, TSFs, and open pit, would increase the erodibility hazard of soils until the completion of stabilization and revegetation activities during reclamation. The construction of other features, including the yards and processing facilities, haul, secondary, and exploration roads, pipeline and powerline corridors, sediment control structures, water supply facilities, other ancillary facilities, and mineral exploration, would also increase the erosion potential of soils within the Project Area. Final reclamation activities under the Proposed Action would include the stabilization and revegetation of all disturbed areas within the Project Area. An indirect effect **to soils** could **occur as a result of** the decline in the water table in Kobeh Valley due to the pumping of ground water for mine operations. This decline in the water table could **result in a shift from a more hydric soil to a more xeric soil. This change in soil conditions could result in a shift in species composition and percent cover of phreatophytic vegetation in Kobeh Valley (Cooper et al. 2006). This would result in a change in vegetation species composition and percent cover; however, this change should not result in a net loss of vegetation sufficient to increase soil erosion.** An additional indirect effect would occur if fissures develop as a result of subsidence associated with the ground water pumping. If fissures develop (see Section 3.2.3) and surface water run-off is captured by the fissures, then the adjacent soils would be eroded into the fissures.

Potential increases in the soil erodibility hazard within the Project Area would be reduced by the implementation of **applicant** committed **practices** and BMPs by the applicant. Erosion and the sedimentation of precipitation runoff would be reduced through the diversion and routing of storm water around Project facilities and the construction of runoff controls (e.g., berms) and sediment collection ponds to protect downstream water quality. Potential wind and water erosion would be reduced by the placement of protective rock and gravel cover. Following construction, areas such as cut and fill embankments and growth media stockpiles would be seeded as soon as practicable and safe to provide vegetation cover that would also reduce wind and water erosion potential. Concurrent reclamation would be maximized to the extent practicable to accelerate the revegetation of disturbed areas. All sediment and erosion control measures would be inspected periodically and repairs or maintenance performed as necessary.

- **Impact 3.8.3.3-1:** Based on the 8,3**55** acres of direct disturbance of soils and the potential indirect effect to soils in Kobeh Valley as a result of potential fissure development and loss of vegetation, accelerated soil erosion rates may occur under the Proposed Action due to continued surface soil disturbance, the removal of vegetation cover, alterations in soil compaction and slope gradients, and soil salvaging and stockpiling activities.

  Significance of the Impact: Based upon the implementation of **applicant committed practices**, BMPs, and reclamation activities, this impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Potential impacts to soil resources within the Project Area would also include the loss of suitable growth media necessary for the successful reclamation of areas disturbed under the Proposed

Action. Reclamation under the Proposed Action would require the re-establishment of vegetation communities consistent with the pre-mining environment. To achieve this, reclamation activities would include the replacement of growth media, of suitable quality, over disturbed areas prior to revegetation efforts. Table 2.1-8 shows that at least 14.3 million yd^3 of material would be needed to reclaim the disturbed areas within the Project Area.

As described above, up to 21 million yd^3 of growth media could be stripped and stockpiled under the Proposed Action. This estimate takes into consideration a predicted ten percent material loss during the salvaging and stockpiling process. Growth media would be stripped during the development of the mine open pit and during construction of the WRDFs and TSFs. The characterization, salvage technique, and stockpiling of growth media would be carried out under the GMMP included in Appendix 10 of the Plan. The GMMP would be a living document that would be implemented to ensure sufficient quantities of suitable growth media are salvaged during the development and operation of the Project. The GMMP includes discussions on proper salvage criteria and techniques, stockpile construction and management practices, storm water and erosion control measures, growth media inventory practices and record keeping, and safety considerations. Under the GMMP, alluvium is considered suitable growth media under the Proposed Action; however, this should not significantly affect growth media quality since the majority of the soils that exist within the Project Area are rated "poor" by the NRCS for use as reclamation topsoil.

- **Impact 3.8.3.3-2:** Growth media availability and quality necessary for the successful reclamation of the Project Area may decrease as a result of surface disturbance activities under the Proposed Action.

  Significance of the Impact: Based upon the implementation of the GMMP, this impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Soil horizon formation is a function of a range of geological, chemical, and biological processes that occur over very long time periods. Surface layer soils typically have higher organic matter content and contain higher nutrient levels than subsurface soils. Project-related surface disturbance, including the stripping of growth media, as described above, would inherently include the unavoidable impact of mixing existing soil horizons as soil is removed, transported, and stockpiled for use during reclamation. Soil biological activity and nutrient cycling would be substantially reduced or eliminated during stockpiling as a result of anaerobic conditions created in deeper portions of the stockpiles; therefore, growth media and cover replaced on Project facilities may not exhibit the level of soil productivity that the naturally occurring soil horizon stratigraphy provides.

The NRCS has rated the majority of the soils within the Project Area as "poor" for use as topsoil. This indicates that the disruption of the naturally occurring soil horizons would not significantly impact the pre-existing soil productivity. Furthermore, previous successful mine reclamation projects utilizing growth media salvaging techniques similar to the Proposed Action have shown that the effectiveness of the soil material to function as growth media is not significantly diminished as a result of stockpiling (Imus 1992).

- **Impact 3.8.3.3-3:** Surface disturbance activities under the Proposed Action would cause the unavoidable mixing of existing soil horizons that may decrease soil productivity.

  Significance of the Impact: Based upon the pre-existing soil conditions and the proven methods for growth media management that would be implemented under the Proposed Action, this impact is considered less than significant, and no further mitigation measures are proposed.

3.8.3.3.1 Residual Adverse Impacts

Implementation of the Proposed Action would result in the unintentional and unavoidable loss of minor amounts of growth media during the salvaging process; however, this impact is mitigated by the ten percent loss consideration used to estimate the total amount of growth media that would be salvaged under the Proposed Action. Furthermore, minor degradation in soil stability and productivity may result from the physical processes of stripping, stockpiling, and replacing growth media over the course of the Project lifespan.

3.8.3.4 No Action Alternative

Under the No Action Alternative, the Proposed Action would not take place; however, EML has **seven** Notices that authorize exploration activities to take place within the Project Area, allowing a total of 3**5** acres of surface disturbance. This disturbance would be isolated and scattered throughout the Project Area; therefore, under the No Action Alternative, impacts to soil resources caused by surface disturbance would be reduced from 8,3**55** acres to 3**5** acres. The impacts discussed under the Proposed Action, including soil erosion and stability impacts, availability of growth media for use during reclamation, and the mixing of existing soil horizons, would be significantly reduced, if not eliminated, under the No Action Alternative. The impact to soil productivity from potential PAG rock infiltration and metal leaching would be eliminated entirely under the No Action Alternative.

- **Impact 3.8.3.4-1:** Based on the 3**5** acres of direct effects to soils, accelerated soil erosion rates may occur under the No Action Alternative due to continued surface soil disturbance, the removal of vegetation cover, alterations in soil compaction and slope gradients, and soil salvaging and stockpiling activities.

  Significance of the Impact: Based upon the implementation of **applicant committed practices**, BMPs, reclamation activities, and the insignificant amount of surface disturbance that would be caused by the No Action Alternative, this impact is considered less than significant, and no further mitigation measures are proposed.

- **Impact 3.8.3.4-2:** Growth media availability and quality necessary for the successful reclamation of the Project Area may decrease as a result of surface disturbance activities under the No Action Alternative.

  Significance of the Impact: Based upon the pre-existing soil conditions and the proven methods for growth media management that would be implemented under the No Action Alternative, this impact is considered less than significant, and no further mitigation measures are proposed.

- **Impact 3.8.3.4-3:** Surface disturbing activities under the No Action Alternative would cause the unavoidable mixing of existing soil horizons that may decrease soil productivity.

  Significance of the Impact: Based upon the pre-existing soil conditions and the insignificant amount of surface disturbance that would be caused by the No Action Alternative, this impact is considered less than significant, and no further mitigation measures are proposed.

3.8.3.4.1 Residual Adverse Impacts

Residual adverse impacts to soil resources under the No Action Alternative would correspond to, but significantly less than, those described under the Proposed Action.

3.8.3.5 Partial Backfill Alternative

The impacts to soil resources under the Partial Backfill Alternative would be nearly identical to those described under the Proposed Action. Under the Partial Backfill Alternative, all Project operations would be carried out as described under the Proposed Action, creating the same amount of surface disturbance (8,3**55** acres) and associated direct and indirect effects; however, the Partial Backfill Alternative would create approximately 527 acres of surface disturbance that would require reclamation as the open pit is backfilled to a grade above the ground water level that would otherwise form a lake under the Proposed Action. Backfill material would be supplied from the Non-PAG WRDF such that all Non-PAG rock would be replaced into the open pit. The backfilled surface would then be reclaimed by replacing growth media prior to revegetation. Similar to the Proposed Action, an indirect effect **to** soils **could occur as a result of the decline in** the water table in Kobeh Valley due to the pumping of ground water for mine operations. This decline in the water table could **result in a shift from a more hydric soil to a more xeric soil. This change in soil conditions could result in a shift in species composition and percent cover; however, this change should not result in a net loss of vegetation sufficient to increase soil erosion**. An additional indirect effect would occur if fissures develop as a result of subsidence associated with the ground water pumping. If fissures develop (see Section 3.2.3) and surface water run-off is captured by the fissures, then the adjacent soils would be eroded into the fissures.

- **Impact 3.8.3.5-1:** Based on the 8,3**55** acres of direct disturbance of soils and the potential indirect effect to soils in Kobeh Valley as a result of potential fissure development and loss of vegetation, accelerated soil erosion rates may occur under the Partial Backfill Alternative due to continued surface soil disturbance, the removal of vegetation cover, alterations in soil compaction and slope gradients, and soil salvaging and stockpiling activities.

  Significance of the Impact: Based upon the implementation of **applicant committed practices**, BMPs, and reclamation activities, this impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

The Partial Backfill Alternative would alter the amount of growth media required for reclamation activities such that the 527-acre, backfilled, open pit bottom would be covered and reclaimed in a manner consistent with the rest of the Project facilities described under the Proposed Action; therefore, an additional 1.7 million yd^3 of growth media would be required to complete the reclamation process under the Partial Backfill Alternative. Growth media would still be required to cover the foundation of the PAG disposal facility and the remaining Non-PAG waste rock at the completion of the backfilling process.

The same amount of growth media (21 million yd^3) would be salvaged and stockpiled under the Partial Backfill Alternative as under the Proposed Action. This amount of material would be sufficient to provide cover for the reclamation of the facilities described under the Proposed Action with an estimated six million yd^3 of growth media remaining. Since it would only require 1.7 million yd^3 of material to cover the additional 527 acres of the backfilled mine pit bottom, there would be no significant impact to growth media availability for use during reclamation under the Partial Backfill Alternative.

- **Impact 3.8.3.5-2:** Growth media availability and quality necessary for the successful reclamation of the Project Area may decrease as a result of surface disturbance activities under the Partial Backfill Alternative.

  Significance of the Impact: Based upon the implementation of the GMMP, which would provide sufficient growth media for use during reclamation of the additional 527 acres required under the Partial Backfill Alternative, this impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Surface disturbance and the construction of Project facilities would be identical under the Partial Backfill Alternative and the Proposed Action; therefore, the impacts to soil resources within the Project Area regarding soil horizon mixing would be the same under the Partial Backfill Alternative as those under the Proposed Action.

- **Impact 3.8.3.5-3:** Surface disturbing activities under the Partial Backfill Alternative would cause the unavoidable mixing of existing soil horizons that may decrease soil productivity.

  Significance of the Impact: Based upon the pre-existing soil conditions and the proven methods for growth media management that would be implemented under the Partial Backfill Alternative, this impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.8.3.5.1 Residual Adverse Impacts

Residual adverse impacts to soil resources under the Partial Backfill Alternative would be identical to those described under the Proposed Action.

3.8.3.6 Off-Site Transfer of Ore Concentrate for Processing Alternative

The impacts to soil resources, both direct and indirect, within and adjacent to the Project Area would be the same under the Off-Site Transfer of Ore Concentrate for Processing Alternative as those described under the Proposed Action. Surface disturbance and the construction of Project facilities would be identical under both alternatives with the exception of 20 acres of surface disturbance associated with the TMO and FeMo processing facilities. These facilities would not be constructed under the Off-Site Transfer of Ore Concentrate for Processing Alternative, thereby reducing the total Project-related surface disturbance to approximately **8,315** acres; therefore, under the Off-Site Transfer of Ore Concentrate for Processing Alternative, the potential impacts to soil resources would be approximately 20 acres less than those under the Proposed Action. Similar to the Proposed Action, an indirect effect **to** soils **could occur as a result of** the decline in the water table in Kobeh Valley due to the pumping of ground water for mine operations. This decline in the water table could **result in a shift from a more hydric soil to a more xeric soil. This change in soil conditions could result in a shift in species composition and percent cover; however, this change should not result in a net loss of vegetation sufficient to increase soil erosion.** An additional indirect effect would occur if fissures develop as a result of subsidence associated with the ground water pumping. If fissures develop (see Section 3.2.3) and surface water run-off is captured by the fissures, then the adjacent soils would be eroded into the fissures.

- **Impact 3.8.3.6-1:** Based on the **8,315** acres of direct disturbance of soils and the potential indirect effect to soils in Kobeh Valley as a result of potential fissure development and loss of vegetation, accelerated soil erosion rates may occur under the Off-Site Transfer of Ore Concentrate for Processing Alternative due to continued surface soil disturbance, the removal of vegetation cover, alterations in soil compaction and slope gradients, and soil salvaging and stockpiling activities.

  Significance of the Impact: Based upon the implementation of **applicant committed practices**, BMPs, and reclamation activities, this impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.8.3.6-2:** Growth media availability and quality necessary for the successful reclamation of the Project Area may decrease as a result of surface disturbance activities under the Off-Site Transfer of Ore Concentrate for Processing Alternative.

  Significance of the Impact: Based upon the implementation of the GMMP, this impact is not considered.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.8.3.6-3:** Surface disturbance activities under the Off-Site Transfer of Ore Concentrate for Processing Alternative would cause the unavoidable mixing of existing soil horizons that may decrease soil productivity.

Significance of the Impact: Based upon the pre-existing soil conditions and the proven methods for growth media management that would be implemented under the Off-Site Transfer of Ore Concentrate for Processing Alternative, this impact is not considered significant.

No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.8.3.6.1 Residual Adverse Impacts

Residual adverse impacts to soil resources under the Off-Site Transfer of Ore Concentrate for Processing Alternative would be identical to those described under the Proposed Action.

3.8.3.7 Slower, Longer Project Alternative

Impacts to soils from the Slower, Longer Project Alternative are expected to be similar to impacts from the Proposed Action at the end of the Project; however, impacts from the Slower, Longer Project Alternative would occur over a period approximately twice as long in duration compared to the Proposed Action. **Similar to the Proposed Action, a**n indirect effect **to** soils **could occur as a result of** the decline in the water table in Kobeh Valley due to the pumping of ground water for mine operations. This decline in the water table could **result in a shift from a more hydric soil to a more xeric soil. This change in soil conditions could result in a shift in species composition and percent cover; however, this change should not result in a net loss of vegetation sufficient to increase soil erosion.** An additional indirect effect would occur if fissures develop as a result of subsidence associated with the ground water pumping. If fissures develop (see Section 3.2.3) and surface water run-off is captured by the fissures, then the adjacent soils would be eroded into the fissures.

- **Impact 3.8.3.7-1:** Based on the 8,3**55** acres of direct disturbance of soils and the potential indirect effect to soils in Kobeh Valley as a result of potential fissure development and loss of vegetation, accelerated soil erosion rates may occur under the Slower, Longer Project Alternative due to continued surface soil disturbance, the removal of vegetation cover, alterations in soil compaction and slope gradients, and soil salvaging and stockpiling activities.

  Significance of the Impact: Based upon the implementation of **applicant committed practices**, BMPs, and reclamation activities, this impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.8.3.7-2:** Growth media availability and quality necessary for the successful reclamation of the Project Area may decrease as a result of surface disturbance activities under the Slower, Longer Project Alternative.

  Significance of the Impact: Based upon the implementation of the GMMP, this impact is not considered significant.

No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.8.3.7-3:** Surface disturbance activities under the Slower, Longer Project Alternative would cause the unavoidable mixing of existing soil horizons that may decrease soil productivity.

  Significance of the Impact: Based upon the pre-existing soil conditions and the proven methods for growth media management that would be implemented under the Slower, Longer Project Alternative, this impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.8.3.7.1 Residual Adverse Impacts

Residual adverse impacts to soil resources under the Slower, Longer Project Alternative would be similar to those described under the Proposed Action. However, accelerated soil erosion rates may occur under the Slower, Longer Project Alternative for a longer duration of proposed activities relative to the Proposed Action.

3.9 Vegetation Resources

This section addresses vegetation resources in and near the Project Area including information on plant communities. Wetland and riparian areas are discussed in Section 3.11.

3.9.1 Regulatory Framework

3.9.1.1 Endangered Species Act

The Federal ESA of 1973, as amended, safeguards the continued existence of any species classified as "endangered" or "threatened," as well as habitat that is determined by the Secretary of the Interior to be critical to such species. The ESA is administered by the USFWS, in consultation with other federal and state agencies. The ESA defines the following terms:

- Endangered species: "... any species which is in danger of extinction throughout all or a significant portion of its range..."
- Threatened species: "... any species which is likely to become an endangered species within the foreseeable future..."
- Critical habitat: "... the specific areas within the geographical area occupied by the species... on which are found those physical or biological features (i) essential to the conservation of the species, and (ii) which may require special management considerations or protection..."

The ESA prohibits the "take" (i.e., killing, harming, or harassment) of listed threatened or endangered species without special exemptions. Candidate species are species for which the USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities. Analogous to the ESA,

NRS 527.270 prohibits removal or destruction of species listed as "threatened with extinction" except by special permit from the Nevada Division of Forestry (NDF).

In addition to listed threatened, endangered, and candidate species, the USFWS identifies another group of species known as species of concern (formerly candidate, category 2 species). Species of concern are not specifically afforded the same protection under the ESA as threatened and endangered species, but federal agencies are required to afford them consideration in planning and decision-making processes. The BLM evaluates species of concern in a manner analogous to threatened and endangered species. On May 1, 1996, the NSO incorporated all former USFWS-designated category 2 candidate species into the Nevada Special Status Species List and classified them as sensitive. Sensitive species are protected by BLM policy, which requires that actions authorized, funded, or carried out by the agency do not contribute to the listing of any candidate or sensitive species as threatened or endangered under the ESA. A list of **BMDO** BLM sensitive species is included as Appendix **G**.

3.9.1.2 Nevada Natural Heritage Program

The Nevada Natural Heritage Program (NNHP) maintains a computerized inventory of information on the general location and status of Nevada's sensitive plants, animals, and natural biological communities. The NNHP tracks state and federally protected species as well as species that the scientific community considers deserving of official listing. The information is derived from reported sightings only, and does not cover every project location.

3.9.1.3 Nevada Native Plant Society

The Nevada Native Plant Society (NNPS) is a non-profit organization that functions in an advisory capacity to state and federal agencies regarding Nevada native plants and their distributions. The NNPS has created six categorical designations of plants to identify their respective concern for these species. These designations do not afford legal status or protection for the species, but the lists produced by NNPS are utilized by agencies in their planning processes for activities that may impact the species or habitat. The listing categories include the following:

- Endangered: Believed to meet the ESA definition of endangered.
- Threatened: Believed to meet the ESA definition of threatened.
- Watch-list: Potentially vulnerable to becoming threatened or endangered.
- Possibly Extirpated: Historically native to Nevada, but may no longer survive in the wild.
- Absent: Currently and historically absent from Nevada, listed in the past but not now of concern.
- Delisted: Dropped from consideration, no longer of concern to NNPS.

3.9.2 Affected Environment

3.9.2.1 Study Methods

The NRCS soil surveys were reviewed to obtain existing vegetation data for the area and potential natural vegetation and ecological site descriptions (SRK 2007b). A gross scale mapping effort of the vegetation in the majority of the Project was conducted by aerial survey (helicopter) on April 28, 2006, and ground surveys (SRK 2007b). Figure 3.9.1 shows the vegetation types in

the Project Area. An additional survey for biological resources, including vegetation, was conducted on July 1 and 2, 2008 (Great Basin Ecology 2008). Phreatophytic vegetation was mapped in the Project Area and vicinity and is shown on Figures 3.2.20 and 3.9.2.

Baseline survey information for special status species in the Project Area was requested from the NNHP and the USFWS. The lists provided by the NNHP and the USFWS identified the following plant species with potential to occur within the region: Beatley buckwheat (*Eriogonum beatleyae*), an imperiled species; and least phacelia (*Phacelia minutissima*), a BLM sensitive species. Additionally, windloving buckwheat (*Eriogonum anemophilum*), a BLM sensitive species, was identified as potentially occurring in the Kobeh Valley portion of the Project Area. The Monte Neva Indian paintbrush (*Castilleja salsuginosa*), a BLM sensitive species, is located approximately two miles southwest of the southern extent of the ten-foot drawdown.

Special status plant surveys were conducted in the majority of the Project Area by SRK on June 30, 2005, and during the bloom period in 2006 (SRK 2007b). Field surveys were also conducted in the well field, powerline, and transmission line areas in mid-July and August 2007 (SRK 2007c). A final special status plant survey in the Kobeh Valley portion of the Project Area was conducted on July 1 and 2, 2008 (Great Basin Ecology 2008). Vegetation in the powerline portion of the Project Area was obtained from the Southwest Regional Gap Analysis Project database maintained by the EPA (http://www.epa.gov/ nerlesd1/land-sci/gap.htm).

3.9.2.2 Existing Conditions

3.9.2.2.1 Vegetation Community Types

Vegetation community types identified within the Project Area include the following: big sagebrush; piñon-juniper woodland; big sagebrush/piñon-juniper; piñon-juniper/big sagebrush; big sagebrush/low sagebrush; salt desert scrub; juniper; and agricultural lands (Figure 3.9.1). Table 3.9-1 summarizes the vegetation community types located within the Project Area. **The Project Area is located within the Central Nevada Basin and Range (NRCS 028B) MLRA.**

Table 3.9-1: Vegetation Community Types within the Project Area

Vegetation Community	Elevational Range (feet amsl)	Acres within the Project Area	Percent within the Project Area
Piñon-Juniper	6,200-8,600	6,89**6.8**	3**0**.1
Big sagebrush	5,700-8,600	**7,115.3**	**31**.1
Big Sagebrush/Piñon-Juniper	5,500-7,500	2,996.1	13.**1**
Piñon-Juniper/Big Sagebrush	6,200-7,000	2,902.3	1**2**.**7**
Big Sagebrush/Low Sagebrush	5,900-6,800	2,643.2	11.**5**
Salt Desert Scrub	5,900-6,200	261.4	1.**1**
Agricultural Land	6,014-6,043	**70.4**	0.**3**
Total	NA	22,**885.6**	100

EXPLANATION

- Wetland/Riparian Areas within Area of Drawdown
- Unpaved Road

Vegetation Communities

DISPLAY

- Agriculture
- Big Sagebrush
- Big Sagebrush / Low Sagebrush
- Big Sagebrush / Pinon-Juniper
- Pinon-Juniper / Big Sagebrush
- Pinon-Juniper Woodland
- Salt Desert Scrub

Data Source

- GAP Analysis
- GAP Analysis/GBE Verified
- SRK

GAP Vegetation Outside the Project Area

- Agriculture
- Aspen
- Grassland
- Greasewood
- Juniper
- Mountain Mahogany
- Mountain Riparian
- Mountain Sagebrush
- Mountain Shrub
- Pinon-Juniper
- Pinon
- Playas
- Sagebrush
- Sagebrush/Perennial Grass
- Salt Desert Scrub

N

0 1 2 3 4 5 6 7 Miles

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

IF THE ABOVE BAR DOES NOT SCALE 1 INCH, THE DRAWING SCALE IS ALTERED

BATTLE MOUNTAIN DISTRICT OFFICE
Mount Lewis Field Office
50 Bastian Road
Battle Mountain, Nevada 89820

DESIGN:	EMLLC	DRAWN:	CVD/GSL	REVIEWED:	RFD
CHECKED:	-	APPROVED:	RFD	DATE:	07/29/2011
FILE NAME:	p1635_Fig3-9-1_Vegetation.mxd				

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Vegetation Communities and Wetland/Riparian Areas

Figure 3.9.1

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

EXPLANATION

Phreatophytes

- Mainly Greasewood and Rabbitbrush
- Mainly Saltgrass and Meadow Grasses
- Playa
- Springs
- Perennial Streams
- 10-Foot Drawdown Maximum Extent
- Project Area Boundary

N

0 1 2 3 4 5 Miles

DESIGN:	EMLLC	DRAWN:	GSL	REVIEWED:	RFD
CHECKED:	-	APPROVED:	-	DATE:	07/31/2012
FILE NAME:	p1635_Fig3-9-2_Phreatophytes.mxd				

BATTLE MOUNTAIN DISTRICT OFFICE
Mount Lewis Field Office
50 Bastian Road
Battle Mountain, Nevada 89820

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Existing Phreatophyte Vegetation

Figure 3.9.2

According to the NRCS, this MLRA 028B supports saltbush-greasewood, big sagebrush, and piñon-juniper woodland vegetation in the progression from low to high ranges in elevation. Shadscale saltbush (*Atriplex confertifolia*), in association with bud sagebrush (*Artemisia spinescens*), spiny hopsage (*Grayia spinosa)*, ephedra (*Ephedra* sp.), winterfat, (*Krascheninnikovia lanata*), fourwing saltbush (*Atriplex canescens*), Indian ricegrass (*Achnatherum hymenoides*), bottlebrush squirreltail (*Elymus elymoides*), and galleta (*Pleuraphis* sp.), characterize the saltbush-greasewood type (NRCS 2012b). As moisture increases, plants associated with shadscale are replaced by needlegrass, bluegrass, bluebunch or beardless wheatgrass (*Pseudoroegneria spicata*), basin wildrye (*Leymus cinereus*), and forbs. Black greasewood (*Sarcobatus vermiculatus*) and Nuttall saltbush (*Atriplex nuttallii*) are noted to be important on some sites. Big sagebrush and black sagebrush (*Artemisia nova*), which grow on soils that are shallow to an indurated pan or to bedrock, are potentially dominant. In the piñon-juniper woodland, bitterbrush (*Purshia tridentata*), serviceberry (*Amelanchier* sp.), and snowberry (*Symphoricarpos* sp.) grow in association with Utah juniper and singleleaf piñon. The highest elevations support thickets of curl-leaf mountain mahogany (*Cercocarpus ledifolius*) and small amounts of mixed conifer forest with limber, bristlecone (*Pinus aristata*), or ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), or white fir (*Abies concolor*). On bottom lands, basin wildrye, creeping wildrye (*Leymus triticoides*), alkali sacaton (*Sporobolus airoides*), wheatgrasses, bluegrasses, sedges (*Carex* spp.), and rushes (*Juncus* spp.) are typical. Black greasewood, rubber rabbitbrush (*Ericameria nauseosa*), and big sagebrush grow on the drier sites. Inland saltgrass, alkali sacaton, black greasewood, rubber rabbitbrush, and saltbush typify the vegetation on strongly saline-alkali soils (NRCS 2012b).

Table 3.9-2 includes a list of ecological sites by vegetation community types within the Project Area. Table 3.9-3 includes the potential native vegetation including percent composition by growth habit for the ecological sites located in the Project Area.

Table 3.9-2: Ecological Sites by Vegetation Community Type within the Project Area

Ecological Site	Ecological Site Numbers	Vegetation Community Type in the Project Area						
		Piñon-Juniper	Big Sagebrush	Big Sagebrush/ Piñon-Juniper	Piñon-Juniper/ Big Sagebrush	Big Sagebrush/ Low Sagebrush	Salt Desert Scrub	Agricult-ural Land
Loamy (8-10" P.Z.)	R028BY010 NV	X	X	X	X	X	X	X
Loamy (10-12" P.Z.)	R028BY007 NV	X		X	X			
Loamy bottom (10-14" P.Z.)	R028BY003 NV		X				X	
Saline bottom	R028BY004 NV		X				X	
Sodic terrace (6-8" P.Z.)	R024XY003 NV						X	
Sodic flat	R028BY020		X					

Ecological Site	Ecological Site Numbers	Vegetation Community Type in the Project Area						
		Piñon-Juniper	Big Sagebrush	Big Sagebrush/ Piñon-Juniper	Piñon-Juniper/ Big Sagebrush	Big Sagebrush/ Low Sagebrush	Salt Desert Scrub	Agricult-ural Land
(5-8" P.Z.)	NV							
Silty (8-10" P.Z.)	R028BY013 NV							X
Shallow calcareous loam (8-10" P.Z.)	R028BY011 NV		X					
Shallow calcareous slope (8-10" P.Z.)	R028BY016 NV	X	X					
Shallow calcareous slope (14"+ P.Z.)	R028BY027 NV	X	X	X	X			

Table 3.9-3: Ecological Site within the Project Area

Ecological Site	Potential Native Vegetation Species	Percent Composition by Growth Habit
Loamy (8-10" P.Z.)	Wyoming big sagebrush, Indian ricegrass, and needleandthread	50 percent grasses, 5 percent forbs, and 45 percent shrubs and trees
Loamy (10-12" P.Z.)	Thurber's needlegrass, bluebunch wheatgrass, and big sagebrush	65 percent grasses, 10 percent forbs, and 25 percent shrubs and trees
Loamy bottom (10-14" P.Z.)	Basin wildrye	85 percent grasses, 5 percent forbs, and 10 percent shrubs
Saline bottom	Basin wildrye and alkali sacaton	80 percent grasses, 5 percent forbs, and 15 percent shrubs
Sodic terrace (6-8" P.Z.)	Shadscale, black greasewood, and bottlebrush squirreltail	10 percent grasses, 5 percent forbs, and 85 percent shrubs
Sodic flat (5-8" P.Z.)	Black greasewood, alkali sacaton, and inland saltgrass	15 percent grasses, 5 percent forbs, and 80 percent shrubs
Silty (8-10" P.Z.)	Winterfat and Indian ricegrass	30 percent grasses, 5 percent forbs, and 65 percent shrubs
Shallow calcareous loam (8-10" P.Z.)	Black sagebrush, Indian ricegrass, and needleandthread	40 percent grasses, 5 percent forbs, and 55 percent shrubs and trees
Shallow calcareous slope (8-10" P.Z.)	Black sagebrush, Indian ricegrass, and needleandthread	40 percent grasses, 5 percent forbs, and 55 percent shrubs
Shallow calcareous slope (14"+ P.Z.)	Bluebunch wheatgrass and black sagebrush	65 percent grasses, 10 percent forbs, and 25 percent shrubs

Big Sagebrush Vegetation Type

The big sagebrush vegetation type is present on alluvial fans, hillsides, and ephemeral drainages and occurs in Akercan (440), Coils (280), Labshaft-Rock, and Rubyhill-Barrier (601) associations found within the Project Area. All soil associations within the Project Area are described in Section 3.8. This vegetation type occurs at elevations between 5,700 and 8,600 feet amsl. The existing dominant overstory vegetation, depending on the location, could be either basin big sagebrush (*Artemisia tridentata* spp. *tridentata*), Wyoming big sagebrush, or mountain big sagebrush (*Artemisia tridentata* spp. *vaseyana*). Understory species commonly associated with basin big sagebrush includes bottlebrush squirreltail (*Elymus elymoides*), rabbitbrush (*Ericameria nauseosa* and *Chrysothamnus* ssp.), and Sandberg bluegrass (*Poa secunda*).

Rabbitbrush, Indian ricegrass, green ephedra (*Ephedra viridis*), and cheatgrass occur with Wyoming big sagebrush. Species occurring with mountain big sagebrush include bluebunch wheatgrass, Sandberg bluegrass, cheatgrass, bottlebrush squirreltail, lupine (*Lupinus* spp.), and scattered rabbitbrush and antelope bitterbrush (*Purshia tridentata*). The big sagebrush type is a prevalent vegetation type accounting for 7,**115.3** acres (3**1**.**1** percent) of the Project Area and generally dominates the lower to mid-elevation zones in the Kobeh Valley and along Garden Pass Road.

Based on the NRCS soil surveys and ecological site descriptions for upland vegetation communities, the current vegetation type is more shrub dominated than the potential natural vegetation described in the ecological site description (SRK 2007b). For most ecological sites in this type, grass species have the potential to comprise over 50 percent of vegetative composition with shrubs being at or below 50 percent of the total composition. Species composition is extremely similar to the potential natural vegetation species; however, percentages of composition are skewed toward shrub dominance. Big sagebrush, antelope bitterbrush, rabbitbrush, bluebunch wheatgrass, Indian ricegrass, Thurber's needlegrass (*Achnatherum thurberianum*), bottlebrush squirreltail, black sagebrush, bud sagebrush, and winterfat are potential natural vegetation species occurring on the four soil associations mentioned above.

Piñon-Juniper Vegetation Type

Piñon-juniper woodlands generally occur on steep hillsides and mountains at all aspects, between 6,200 and 8,600 feet amsl. This vegetation type generally occurs on shallow, loamy soils with high percentages of coarse fragments. Singleleaf piñon and Utah juniper dominate the overstory in this type. The understory is often nothing more than barren soil in dense stands of this vegetation type. Piñon-juniper woodlands occur in Mau-Shagnasty-Eightmile (321), Labshaft-Rock outcrop complex, and Ratto soil associations. Shrubs present include mountain big sagebrush, basin big sagebrush, Wyoming big sagebrush, antelope bitterbrush, black sagebrush, and rabbitbrush. Grasses including Sandberg bluegrass, bottlebrush squirreltail, Thurber's needlegrass, Idaho fescue (*Festuca idahoensis*), basin wildrye, and bluebunch wheatgrass are present in the generally sparse understory. These woodlands typically occur along the north south trending mountains above elevations of 6,700 feet amsl and were present in approximately 6,**896**.**8** acres (**30.1** percent) of the Project Area.

According to the NRCS ecological site description for the Mau-Shagnasty-Eightmile association, the potential natural vegetation for the sites currently vegetated by piñon-juniper woodlands includes Thurber's needlegrass, bluebunch wheatgrass, and big sagebrush. No potential native

vegetation was documented for Ratto and Labshaft-Rock outcrop complex associations. For the Mau-Shagnasty-Eightmile association, the potential natural vegetation has been largely replaced with piñon-juniper woodlands. This encroachment by piñon-juniper woodlands implies a lack of fire in the area. Since the advent of fire suppression, there has been a migration of piñon-juniper habitat into sagebrush steppe communities.

Big Sagebrush/Piñon-Juniper Vegetation Type

The big sagebrush/piñon-juniper vegetation type occurs within and surrounding the Project Area. This vegetation type constitutes up to 1**3.1** percent (2,996.1 acres) of the vegetation within the Project Area and is located just north of the proposed open pit location and along the bench of the Whistler Range on the Kobeh Valley side. Islands of piñon-juniper woodlands and scattered trees occur throughout the big sagebrush in this vegetation type and indicate an encroachment of piñon-juniper woodlands into the big sagebrush type. This vegetation type comprises the following soil associations: Chad-Cleavage-Softscrabble (681), Mau-Shagnasty-Eightmile, and Labshaft-Rock outcrop complex. The elevation for this vegetation type ranges from 5,500 to 7,500 feet amsl. The big sagebrush/piñon-juniper vegetation type is typically found on hillsides, alluvial fans, and benches. Understory vegetation found within this existing type include bluebunch wheatgrass, Sandberg bluegrass, bottlebrush squirreltail, basin wildrye, Idaho fescue, and Thurber's needlegrass. Shrub and overstory species include big sagebrush, Nevada ephedra (*Ephedra nevadensis*), and serviceberry .

The soil associations found in the area of this vegetation indicates that the potential natural vegetation was historically a grass dominated vegetation type with sagebrush and other shrubs in percentages of no more than 25 percent; however, no data are available for the potential natural vegetation for the Labshaft-Rock outcrop association to compare to the existing vegetation type.

Piñon-Juniper/Big Sagebrush Vegetation Type

The piñon-juniper/big sagebrush vegetation type is commonly found in the north and central portions of the Project Area and makes up approximately 12.**7** percent (approximately 2,902.3 acres) of the Project Area. This vegetation type is typically found at elevations between 6,200 and 7,000 feet amsl, and is dominated by piñon-juniper woodlands with many inclusions of big sagebrush located throughout. Existing understory vegetation includes Nevada ephedra, Sandberg bluegrass, bluebunch wheatgrass, bottlebrush squirreltail, Idaho fescue, basin wildrye, cheatgrass, and Indian ricegrass. Overstory species including rabbitbrush and low sagebrush (*Artemisia arbuscula*) are also present but not dominant.

Grasses are a large percentage of the potential natural vegetation occurring within the Labshaft-Rock outcrop complex, Handy (922), Atrypa (830), Shagnasty-Ravenswood-Rock outcrop (764), and Chad-Cleavage-Softscrabble (681) associations where the existing piñon-juniper/black sagebrush vegetation type occurs. The potential natural vegetation for the Atrypa association includes piñon, juniper, and big sagebrush. This potential natural vegetation is similar to the existing vegetation type of all the soil associations present. Soil map unit 681 should have 45 percent grass and 45 percent shrub composition for the potential natural vegetation, whereas the other associations have a grass composition up to 65 percent and no lower than 55 percent. The existing vegetative community (woodland/shrub community) has transitioned to a later seral stage from that of a grass-dominated area. Potential native vegetation understory and overstory species at these sites include bluebunch wheatgrass, Thurber's needlegrass, low sagebrush, black

sagebrush, goldenweed (*Haplopappus acaulis*), big sagebrush, Utah juniper, singleleaf piñon, Indian ricegrass, needle and thread grass (*Hesperostipa comata*), Nevada bluegrass (*Poa nevadensis*), bottlebrush squirreltail, and black greasewood.

Big Sagebrush/Low Sagebrush Vegetation Type

A substantial portion (2,643.2 acres and 11.**5** percent) of the Project Area is vegetated by the big sagebrush/low sagebrush type. This type occurs on the alluvial fans, hillsides, and bottom areas in the northeastern section of the Project Area and extends beyond the Project boundary to the east toward Diamond Valley where the type is bound by Garden Pass Creek. This type occurs at lower to mid-elevations, which range from 5,900 to 6,800 feet amsl. Islands of low sagebrush occur within the big sagebrush community with occasional Utah juniper in the area. Other overstory species found in the existing community include Nevada ephedra and rabbitbrush. Dominant understory vegetation species found in this type include squirreltail and Indian ricegrass. The big sagebrush/low sagebrush type is solely found in the Ratto soil association. The Project Area is located within the NRCS 028BY010NV MLRA. The NRCS rangeland ecological site description for this MLRA identifies Wyoming big sagebrush as the dominant shrub species, with other species of trees and shrubs including Douglas' rabbitbrush, fourwing saltbush (*Atriplex canescens)*, Nevada ephedra, spiny hopsage (*Grayia spinosa)*, and Utah juniper. The NRCS also identifies Indian ricegrass and needle and thread as the dominant grasses in this MLRA, with other grasses including bottlebrush squirreltail, Sandberg's bluegrass, western wheatgrass, and basin wildrye. Forbs include globemallow (*Sphaeralcea* sp.), phlox (*Phlox* sp.), and paintbrush.

Vegetation in this community generally agreed with the potential native vegetation predicted by the NRCS ecological site description for loamy 8-10" P.Z, except for the presence of low sagebrush which was observed during the surveys but not predicted for the ecological site.

Salt Desert Scrub Vegetation Type

The salt desert scrub vegetation type generally occurs in saline areas along drainages, margins of lake beds and marshes, and on flats and basins at elevations between 5,900 and 6,200 feet amsl. Phreatophytic vegetation is typically located in this vegetation type. Black greasewood dominates the south end of Kobeh Valley and comprises approximately 261.4 acres, or 1.1 percent of the Project Area. Associated species in the area include rabbitbrush, halogeton (*Halogeton glomeratus*), spiny hopsage, shadscale saltbush, iodine bush (*Allenrolfea occidentalis*), and saltgrass. Low sagebrush also occurs as inclusions throughout the greasewood community and transitions to low sagebrush communities where there is elevated clay content in soils (Great Basin Ecology 2008).

The list of potential native vegetation included in the NRCS ecological site descriptions associated with this vegetation community and species observed include shadscale and black greasewood.

Agricultural Land

Approximately **70.4** acres of the Project Area is located on private agricultural land along the proposed powerline route. This vegetation type is cultivated, and is therefore altered from natural

conditions, and constitutes approximately 0.1 percent of the Project Area. **Although this vegetation type is located in the loamy (8-10" P.Z.) and silty (8-10" P.Z.), the potential native vegetation is not present as a result of the modified landscape.**

Vegetation Types Located Outside of the Project Area

Additional vegetation communities located outside of the Project Area have the potential to be indirectly impacted by the Project. These communities include agricultural lands that are located outside of the Project Area in the Roberts Creek drainage and phreatophytic vegetation. Phreatophytic vegetation as described in Section 3.2.2.6.5 includes plants that send their roots in to the water table and depend on a constant supply of ground water. The mapped locations of phreatophytic vegetation in the Project Area and vicinity are illustrated on Figures 3.2.20 and 3.9.2.

3.9.2.2.2 Special Status Plant Species

The Project Area contains limited acreage of potentially suitable habitat for Beatley buckwheat. Although several species of buckwheat were identified in the Project Area, including locations on or around the rock outcrops, Beatley buckwheat was not among the species identified. Round headed desert buckwheat (*Eriogonum sphaerocephalum*), umbrella desert buckwheat (*E. umbellatum*), and parsley desert buckwheat (*E. heracleoides*) were the species observed in the Project Area (SRK 2007b).

The claypan soils located on the valley floor and the volcanic ridge located in the eastern portion of the proposed well field in Kobeh Valley were identified as potential habitat for windloving buckwheat. Potential habitat in the Project Area was surveyed and no windloving buckwheat individuals were located.

No occurrences of least phacelia were identified during the survey. Most of the drainages in the Project Area are ephemeral drainages serving as channels for storm water drainage and spring snow melt. The associated species, false hellebore (*Veratrum viride*), mule's ear (*Wyethia amplexicaulis*), and aspen, were also not found in the Project Area. Only five springs were located in the Project Area. Garden Pass Spring, located in the northeast portion of the Project Area, has been developed into a stock pond. The soil was heavily compacted and devoid of vegetation due to **trampling and heavy** use. A second "spring" was located on the east slope of Mount Hope. This "spring" consisted of a pipeline extending from an historic adit. The pipeline transported a portion of the flow to a stock pond that was in similar condition to the Garden Pass Spring stock pond. Neither site provided suitable habitat for least phacelia. Mount Hope Spring was dry, with extensive piñon-juniper and sagebrush dominating the site. No other suitable habitat was observed during the survey (SRK 2007b).

The Monte Neva Indian paintbrush, a Nevada endemic, has not been located within the Project Area; however, the BLM and NNHP have identified this species as occurring at a location that is approximately two miles southwest of the southern extent of the ten-foot drawdown just north of U.S. Highway 50 near Hot Springs Hill between Lone Mountain and 3 Bars Road outside the Project Area boundary. Focused surveys for the Monte Neva Indian paintbrush were not conducted in the Project Area because suitable habitat for this species is not located within the Project Area. This is one of the two known populations of this species in Nevada. The NNHP describes potential habitat for the Monte Neva Indian paintbrush as damp, open, alkaline to

saline clay soils of hummocks and drainages on travertine hot-spring mounds with greasewood, rubber rabbitbrush, and alkali sacaton (http://heritage.nv.gov/atlas/castisalsu.pdf).

3.9.2.2.3 Wildland Fire Prevention and Control

Historically, the approach to fire management has been one of full or modified suppression for all wildland fires on public lands; therefore, very limited use of prescribed fire or fuels management has occurred. The past practice of fire suppression has led to the development of a dense overstory that inhibits the existence of a healthy native herbaceous understory. This practice has also resulted in creating a high level of fire fuel hazards. As a result, there have been numerous and extensive wildland fires in the recent past and greater emphasis has now been placed on wildland fire rehabilitation and hazardous fuels reduction. New national direction is outlined in the Review and Update of the 1995 Federal Wildland Fire Management Update (2001 Federal Fire Policy). In addition, the National Fire Plan (NFP) provides for implementation of hazardous fuel reduction activities such as those outlined in the Healthy Forests Initiative and **HFRA**. Congress has provided funds to address hazardous fuels management issues and to re-introduce fire into fire dependent ecosystems.

BLM fire management activities include the creation of fuel breaks via mechanical thinning, by the BLM, adjacent to key vegetative communities prior to conducting prescribed fire. Activity fuels created by vegetation removal are either piled and burned or chipped. Pile burning disposal involves the burning of piles of specific size and fuel size distribution. BLM fire management activities also include treatment with prescribed fire followed by seeding. A combination of ignition devices are used including helitorches, terra torches, drip torches, fuses, flare guns, and hand thrown ignition devices. The size of burn areas are limited by the existing and planned fuel breaks, time of day and season of ignition, live fuel moisture variations as a result of changes in elevation, and firing patterns.

3.9.2.2.4 Climate Change

Vegetation composition is integral to many **functioning ecosystems**. Potential changes in vegetation associated with projected effects of climate change may alter **plant communities (U.S. Global Research Program 2009)**. Climate change contributes to changes in stream systems, such as flow, temperature, and turbidity. It is predicted that climate change will exacerbate the effects of land management activities to streams and aquatic habitats. Changes in climate can influence the timing and length of seasons, which in turn can have a direct effect on plants and animals. This includes changes in ranges, abundances, phenology (timing of an event such as breeding), morphology and physiology, community composition, biotic interactions and behavior. Changes are being seen in all different types of taxa, from insects to mammals, in North America as well as on many other continents. Climate change is contributing to effects on glacial systems, which are advancing or receding, depending on local conditions.

Climate change predictions include increased duration and frequency of droughts and an increase in extreme precipitation events. This combination can result in an increase of surface soil erosion and gullying beyond current levels. Continental scale shifts in precipitation may lead to areas where there are increases and decreases in soil moisture. Prolonged drought would also affect soil respiration, resulting in a decreased soil **C** pool. Climate change (warmer/drier summer conditions, warmer winters) may be one of the factors in recently observed changes in forest health involving large areas of tree mortality from a variety of insect agents. Many forest

communities are resilient in responding to normal variations in weather and climate to which they are adapted. However, currently occurring increases in forest insect infestations and tree mortality throughout the Planning Area may be partially due to global climate change acting in concert with other variables such as long-term fire suppression, particularly in areas where stands are overstocked. Due to changes in climate, grasslands and rangeland could expand into previously forested areas. Additionally, sagebrush habitats may decline sharply throughout the region and be replaced with grasslands. Increasing CO_2 concentrations also lead to preferential fertilization and growth of specific plant species, such as invaders like cheat grass. Climate change may favor certain shrub species, both native and exotic. Increased CO_2 in the atmosphere may favor growth of most woody plants and "cool-season" grasses at the expense of "warm season grasses." These and other differences among species could lead to changes in the composition of rangeland vegetation, but generalizations are difficult. Climate change affects the water cycle through decreased snow pack, runoff timing, and changes to total runoff volumes. Increased frequency of high intensity rainfall events related to global climate change could result in increased stream sedimentation or alteration of stream channels.

3.9.3 Environmental Consequences and Mitigation Measures

The environmental consequences of the Proposed Action and each alternative as they relate to vegetation resources are discussed in this section.

3.9.3.1 Significance Criteria

Based upon NEPA guidelines and commonly accepted criteria, the Proposed Action or alternatives would normally be considered to have a significant effect on vegetation resources if the following occurred:

- Substantially affect a species or habitat afforded protection under either the ESA or state law, or designated as having special status (e.g., species of concern, sensitive species, etc.) by an overseeing agency;
- Eliminate, reduce, or adversely affect a unique or rare natural plant community within the Project Area;
- Failure of reclamation efforts to achieve a stable, perennial vegetation cover that protects disturbed soil surfaces against erosion; or
- Establish plant communities on the reclaimed areas that fail to meet the reclamation objective for providing suitable forage for livestock, wildlife, and wild horses.

3.9.3.2 Assessment Methodology

Potential effects on vegetation resources can be categorized as direct and indirect, as well as short term (i.e., during the life of the Project) and long term. Direct effects on vegetation resources would include temporary and permanent loss of vegetation associated with construction, operation, and maintenance of the Project. Additional direct effects from the Project could include degradation of vegetation due to trampling, soil compaction, spills, increased access, and introduction of noxious weeds and invasive and nonnative species. Indirect effects could occur as a result of water table decline. Short-term impacts are those that could occur during Project implementation and until reclamation is complete. Long-term impacts are those occurring after reclamation is complete. The effects are determined to be significant or not significant based on the applicable significance criteria listed in Section 3.9.3.1.

3.9.3.3 Proposed Action

3.9.3.3.1 Vegetation Communities Disturbed by the Proposed Action

Implementation of the Proposed Action would result in the temporary disturbance or loss of up to 8,3**55** acres of vegetation over the 44-year mine life. Table 3.9-**4** indicates the types of plant communities that could be impacted within the Project Area boundary. None of the eight vegetation communities located in the Project Area are considered unique with regard to the area's known resources, as they represent some of the most common vegetation types in northern Nevada. Under the Proposed Action, eight plant communities (big sagebrush, piñon-juniper, big sagebrush/ piñon-juniper, piñon-juniper/big sagebrush, big sagebrush/low sagebrush, salt desert scrub, and juniper) would be disturbed. Disturbance acreages are presented in Table 3.9-**4**.

As indicated in Table 3.9-**4**, the vegetation community with the largest impact from Project-related surface disturbance would be the big sagebrush community, with 28.8 percent of the total surface disturbance occurring in that community. The disturbance would be associated with the construction of the North TSF, South TSF, the Kobeh Valley Well Field, and the powerline. Approximately 24.5 percent of the surface disturbance would occur in the big sagebrush/piñon-juniper community, and 20.6 percent would occur in the piñon-juniper/big sagebrush vegetation community, 16.3 percent would occur in the piñon-juniper vegetation community, and 9.1 percent would occur in the big sagebrush/low sagebrush vegetation community. Approximately 0.5 percent of disturbance would occur in the salt desert scrub community and 0.02 percent in the agricultural lands.

Table 3.9-4: Areas of Vegetation Communities Disturbed or Removed by Project Components

Vegetation Community Types	Total Project Disturbance[3]	Percent of Total Project Disturbance
Big sagebrush	**1,976**	**23.80**
Piñon-juniper	**1,401**	**16.87**
Big sagebrush/ Piñon-juniper	**2,195**	**26.43**
Piñon-juniper/Big sagebrush	**1,895**	**22.82**
Big sagebrush/ Low sagebrush	**830**	**9.99**
Salt Desert Scrub	**6**	**0.07**
Agricultural	**2**	**0.02**
Undetermined (unspecific exploration activities)[2]	50	-
Total Disturbance Acreage	**8,355**	100.0

[1] Up to 50 acres of exploration surface disturbance may occur under the Proposed Action. **Since the location of exploration areas cannot be determined at this time, the impact of that disturbance has not been calculated.** Site-specific reviews/approvals would be coordinated with the BLM.

The Proposed Action would result in the conversion of tree- and shrub-dominated vegetation types in the Project Area to grass/forb-dominated vegetation types following reclamation. Over the long term, shrubs and trees would become reestablished and increase in abundance within the majority of disturbed areas as a result of reclamation and natural recolonization. Due to timing of Project development and concurrent reclamation, the total acreage of vegetation disturbed would not occur all at one time. Upon completion of the Project, the reclamation portion of the Proposed Action would be completed for 7,6**21** acres (9**1** percent of the disturbed area).

Approximately 734 acres of vegetation in the vicinity of the open pit would be removed and not reclaimed.

The removal of 3,**296** acres of singleleaf piñon and Utah juniper trees would be a long-term impact, since it would take approximately 75 to 100 years for mature woodlands to become reestablished in the disturbance areas. Of the 3,**296** acres of total disturbance in piñon-juniper vegetation, approximately 734 acres of piñon-juniper woodland would be permanently lost due to the development of the open pit.

Project-related development would also impact approximately 5,**007** acres of shrub-dominated vegetation types. This loss would represent a long-term impact as it would take up to 15 to 20 years following reclamation for mature shrubs species to reestablish.

Reclamation and revegetation would minimize the aforementioned impacts to vegetation. A total of 7,6**21** acres (or 9**1** percent of the disturbed area) would eventually be revegetated. Only the 734 acres of the open pit would remain unvegetated. Revegetation activities would be conducted as outlined in Section 2.1.17. Reclamation seed mixtures and application rates, based on BLM requirements, are shown in Tables 2.1-9 and 2.1-10. These mixtures would provide forage and cover species similar to the pre-disturbance conditions, facilitating the post-mining land uses of livestock grazing, wild horses, and wildlife habitat. In addition, these seed mixes have been determined based on the species' ability to grow within the constraints of the low annual precipitation experienced in the region, its suitability for site aspect, and the elevation and soil type. The proposed seed mixture and application rates would be subject to modification by the BLM. The actual seed mixture and application rates would be determined prior to seeding based on the results of reclamation in other areas of the mine, concurrent reclamation, revegetation test plots, or changes by the BLM in its seed mix requirements.

- **Impact 3.9.3.3-1:** Disturbance or removal of vegetation community types would occur as a direct result of the Proposed Action.

  Significance of the Impact: The impact would be considered less than significant because the disturbance would not occur all at once and would include concurrent reclamation.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Phreatophytes that may be impacted as a result of the Proposed Action aquifer drawdown occur in Kobeh Valley. In the central Kobeh Valley, as discussed in Section 3.2 the shallow ground water (between zero and ten feet bgs) at the valley floor supports substantial areas of phreatophyte vegetation (Figure 3.9.2). Current conditions include the presence of the following phreatophytic species in the phreatophyte vegetation community: greasewood; rabbitbrush; and saltgrass. ET of ground water by phreatophytes is the primary ground water discharge in the basin. As illustrated on Figure 3.2.9, approximately 4,122 acres of phreatophyte vegetation were mapped as occurring within the area predicted to be impacted by aquifer drawdown. More recent data from satellite imagery indicate that as many 28,500 acres of phreatophytes are located in Kobeh Valley; however, these data are not yet finalized (USGS 2011). In order to verify the extent of phreatophytes potentially impacted by the Project, the soil associations in Kobeh Valley were reviewed to determine

which soils are associated with phreatophytes. This review identified Bubus loam (1010), Bubus-Dianev (1012), Ocala silt loam (161), Dianev silt loam (250), Brinnum silt loam (400), and Beanflat silt loam (410). The extent of these soils in Kobeh Valley is similar to the extent of phreatophytes identified in the preliminary results from the USGS Open-File Report 2011-1089 (USGS 2011), and are distributed southwest of the Project Area and overlap modeled ground water drawdown contours up to 70 feet in depth. However, the majority of phreatophytes that would be impacted are located in the area predicted to experience a ten- to 20-foot drawdown. The resultant depth to ground water would be between ten feet (if the baseline ground water level was at the surface) and up to 30 feet (if the baseline ground water level was ten feet below the surface). On average, the majority of the phreatophytes are predicted to experience an increase in depth to ground water of 20 feet as a result of the Proposed Action. However, based on the more recent phreatophyte location data some of the phreatophytes would be located where the depth to ground water is predicted to increase as much as 70 feet as a result of the Proposed Action.

Where the phreatophytes would be impacted as a result of ground water drawdown, the increase in the depth to ground water is expected to result in impacts to the phreatophyte vegetation through a change in vegetation composition and cover. Lowering of the water table resulting from ground water drawdown is a change in resource availability for the vegetation with an associated increase in ecological stress. Species adapted to conditions of higher available water would be replaced over time by species adapted to conditions of lower available water. Change in the depth to ground water is not the only factor that affects the composition of phreatophyte communities. Other factors that affect changes in phreatophyte communities include the following: amount of annual precipitation; climate change; livestock grazing; and fire regime (McLendon 2011).

In the areas where the phreatophytes would experience an increased depth to water of 20 feet (which is what the majority of phreatophytes would experience), the xeric phreatophytes (rabbitbrush and greasewood) are expected to respond by increasing their root depth as the depth to ground water increases and utilize more surface water when it is available (Naumberg et al. 2005). While the percent cover of greasewood and saltgrass may decrease, the percent cover of rabbitbrush would increase (McLendon 2011; Stringham 2011). In areas where the phreatophytes would experience an increase depth to water of 50 feet, the vegetation community would likely shift from greasewood and rabbitbrush to mainly rabbitbrush, and then as the depth to ground water increases more would likely shift to a community dominated by Wyoming big sagebrush (populations of Wyoming big sagebrush are located adjacent to the xeric phreatophytes in Kobeh Valley). A water table decline could result in perennially drier soils. The deeper water table would preclude salt accumulation at the soil surface, allowing precipitation to leach salts to deeper soil depths, resulting in drier, less saline soils, and creating conditions where xeric phreatophytes can survive (Cooper et al. 2006). Additionally, recovery of the water table following Project-related ground water pumping could result in a transition back to a pre-Project vegetation community state (Stringham 2011).

Impacts to other vegetation communities as a result of drawdown are not expected. The predicted ten-foot water drawdown contour for the Proposed Action does not intercept any known phreatophyte vegetation within Diamond Valley, Antelope Valley, or Pine Valley.

- **Impact 3.9.3.3-2: Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities.**

  Significance of the Impact: The impact is **not** considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

The Project mining activities and vehicular traffic would affect vegetation within the immediate vicinity of the Project Area by increasing the amount of airborne particulate deposition onto vegetation surfaces. Deposition could result in lowered primary production in plants due to reduced photosynthesis and decreased water-use efficiency. The potential effects on vegetation from dust would be reduced by wind and periodic precipitation, which would remove some of the accumulated dust. In addition, the implementation of the fugitive dust reduction measures outlined in the Proposed Action would reduce the impact of dust deposition on vegetation.

- **Impact 3.9.3.3-3:** Vegetation in the immediate vicinity of the Project Area could suffer periodic short-term reductions in primary production due to airborne particulate deposition onto exposed surfaces.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

The fenced area around the Project would limit BLM fire management activities by preventing normal access. The development of the Project well field in Kobeh Valley would create multiple unvegetated linear features (roads) that could be used as fire breaks in BLM fire management activities. These constructed roads could also provide additional access for potential fire management activities. Mine equipment and water resources could also be used to aid in suppression activities.

Potential impacts to the management of vegetation communities for wildland fire prevention and control as a result of Project activities would be limited as a result of the implementation of precautionary measures outlined in Sections 2.1.10 and 2.1.14.8.

- **Impact 3.9.3.3-4:** The Project would result in limitations and enhancements to the BLM's fire management activities within the vicinity of the Project Area.

  Significance of the Impact: Based on the conclusions from the analysis, the impact is not significant. **T**he following mitigation is proposed **for this impact**.

- **Mitigation Measure 3.9.3.3-4:** During periods of high fire danger, EML would utilize welding tents during welding activities along the pipeline or powerline routes in the Project Area.

- **Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.9.3.3-4 would be effective at reducing the potential for Project activities to result in wildland fires.

3.9.3.3.2 Special Status Plant Species

Based on habitat requirements or known distribution, three special status plant species were identified as potentially occurring in the Project Area. As discussed above, field surveys were conducted in the Project Area for Beatley buckwheat, windloving buckwheat, and least phacelia. No habitat was observed for least phacelia and no populations of least phacelia were observed in the Project Area. Limited potentially suitable habitat was identified for Beatley buckwheat and windloving buckwheat; however, no populations of Beatley buckwheat or windloving buckwheat were observed in the Project Area.

- **Impact 3.9.3.3-5:** Disturbance or removal of potential habitat for Beatley buckwheat and windloving buckwheat could occur as a result of the Proposed Action.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Habitat for Beatley buckwheat, windloving buckwheat, and least phacelia is located outside of the Project Area within the area that is predicted to be impacted by the aquifer drawdown. Potential habitat for Beatley buckwheat includes dry volcanic outcrops and potential habitat for windloving buckwheat includes claypan soils located on the valley floor and volcanic ridges. While there is potential habitat for these two species of buckwheat located within the area predicted to be impacted by the aquifer drawdown, these species are not wetland-dependent. Therefore, no indirect impacts to these species are anticipated as a result of the aquifer drawdown.

Potential habitat for least phacelia includes vernally saturated, summer-drying, sparsely vegetated, partially shaded to fully exposed areas of bare soil and mud banks in meadows. Potential habitat for this species is located within the area predicted to be impacted by the aquifer drawdown. However, additional habitat for this species is located outside of the area predicted to be indirectly impacted by the Proposed Action and as of 2001 this species had been located 39 times in the State of Nevada (http://heritage.nv.gov/atlas/phaceminut.pdf).

- **Impact 3.9.3.3-6:** Potential, unsurveyed habitat for least phacelia located outside of the Project Area would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the potential habitat could potentially impact these species indirectly.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Although there are no known occurrences of Monte Neva Indian paintbrush in the Project Area; the BLM has identified occupied habitat for this species between Lone Mountain and 3 Bars Road near Hot Springs Hill. The species is aquatic or wetland-dependent but lies outside of the area impacted by the predicted aquifer drawdown.

- **Impact 3.9.3.3-7:** Occupied and potential habitat for the Monte Neva Indian paintbrush is not expected to experience water stress because it is located outside of the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. However, lowering of the water table in the occupied and potential habitat could potentially impact this species.

  Significance of the Impact: No indirect impact from the Proposed Action is expected to this species or occupied habitat because they are located outside of the predicted water table drawdown. Yearly monitoring would be conducted for this species. If impacts to the species from the Project are detected mitigation would be developed by the BLM and EML.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.9.3.3.3 Residual Adverse Impacts

Residual adverse impacts to vegetation would include the permanent loss of vegetative productivity from approximately 734 acres of land associated with the open pit that would not be reclaimed and a long-term change in vegetation composition (i.e., tree and shrub dominated communities to grass and forb dominated communities, potential **change in** phreatophyte vegetation **percent cover and composition**) as a result of Project development and operation.

Residual adverse effects to special status species would not occur as a result of the Project since no special status species were located within the Project Area. There is a potential residual indirect effect to potential unoccupied special status plant species habitat.

3.9.3.4 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and associated impacts to vegetation would not occur. EML would continue existing activities under previously permitted Notices, and the area would remain available for future mineral development or for other purposes as approved by the BLM.

3.9.3.4.1 Vegetation Communities Disturbed by the No Action Alternative

Under the No Action Alternative, EML would continue to conduct mineral exploration and data acquisition within the Project Area. Ongoing reclamation would help to minimize impacts to vegetation through continuation of current and ongoing activities, with resulting short-term impacts to herbaceous species and long-term impacts to woody species.

- **Impact 3.9.3.4-1:** Implementation of the No Action Alternative would result in the general removal of vegetation.

Significance of the Impact: The impact is not considered significant.

3.9.3.4.2 Special Status Plant Species

No additional disturbance beyond that previously authorized would occur in association with ongoing existing operations. As a result, there would be no additional impacts to potential habitat for special status plant species under this alternative.

3.9.3.4.3 Residual Adverse Impacts

The No Action Alternative would have unavoidable short-term impacts to herbaceous species and long-term impacts to wood vegetation species as part of surface disturbance associated with permitted exploration and data acquisition; however, revegetation and reclamation would minimize these impacts to vegetation.

3.9.3.5 Partial Backfill Alternative

3.9.3.5.1 Vegetation Communities Disturbed by the Partial Backfill Alternative

Impacts to vegetation community types would be similar to those described for the Proposed Action; however, the Partial Backfill Alternative would involve the partial backfilling of the open pit to eliminate the pit lake and the floor of the open pit would be reclaimed using growth media and then seeded. Although the Proposed Action would have 734 acres that would remain unvegetated in the open pit, under this alternative approximately 527 acres would remain unvegetated following Project completion and reclamation; therefore, impacts to vegetation would be similar to, but slightly less than, those described for the Proposed Action.

- **Impact 3.9.3.5-1:** Disturbance or removal of vegetation community types would occur as a result of the Partial Backfill Alternative.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Impacts to phreatophyte vegetation would be similar to those under the Proposed Action.

- **Impact 3.9.3.5-2: Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities.**

  Significance of the Impact: The impact is **not** considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

The Project mining activities and vehicular traffic would affect vegetation within the immediate vicinity of the Project Area by increasing the amount of airborne particulate deposition onto vegetation surfaces. Deposition could result in lowered primary production in plants due to reduced photosynthesis and decreased water use efficiency. The potential effects on vegetation from dust would be reduced by wind and periodic precipitation, which would remove some of the accumulated dust. In addition, the implementation of the fugitive dust reduction measures outlined in the Proposed Action would reduce the impact of dust deposition on vegetation.

- **Impact 3.9.3.5-3:** Vegetation in the immediate vicinity of the Project Area could suffer periodic short-term reductions in primary production due to airborne particulate deposition onto exposed surfaces.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

The fenced area around the Project would limit BLM fire management activities by preventing normal access. The development of the Project well field in Kobeh Valley would create multiple unvegetated linear features (roads) that could be used as fire breaks in BLM fire management activities. These constructed roads could also provide additional access for potential fire management activities. Mine equipment and water resources could also be used to aid in suppression activities.

Potential impacts to the management of vegetation communities for wildland fire prevention and control as a result of Project activities would be limited as a result of the implementation of precautionary measures outlined in Sections 2.1.10 and 2.1.14.8.

- **Impact 3.9.3.5-4:** The Project would result in limitations and enhancements to the BLM's fire management activities within the vicinity of the Project Area.

  Significance of the Impact: Based on the conclusions from the analysis, the impact is not significant. **T**he following mitigation measure is proposed **for this impact**.

- **Mitigation Measure 3.9.3.5-4:** During periods of high fire danger, EML would utilize welding tents during welding activities along the pipeline or powerline routes in the Project Area.

- **Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.9.3.5-4 would be effective at reducing the potential for Project activities to result in wildland fires.

3.9.3.5.2 Special Status Plant Species

Impacts to special status plant species and their habitat as a result of the Partial Backfill Alternative would be similar to those for the Proposed Action.

- **Impact 3.9.3.5-5:** Disturbance or removal of potential habitat for Beatley buckwheat and windloving buckwheat could occur as a result of the Proposed Action.

  Significance of the Impact: The impact is not considered significant.

No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.9.3.5-6:** Potential, unsurveyed habitat for least phacelia located outside of the Project Area would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the potential habitat could potentially impact these species indirectly.

  Significance of the Impact: The indirect impact of the Proposed Action to potential habitat of these species would not meet the significance criteria listed in Section 3.9.3.1.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.9.3.5-7:** Occupied and potential habitat for the Monte Neva Indian paintbrush is not expected to experience water stress because it is located outside of the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. However, lowering of the water table in the occupied and potential habitat could potentially impact this species.

  Significance of the Impact: No indirect impact from the Proposed Action is expected to this species or occupied habitat because they are located outside of the predicted water table drawdown. Yearly monitoring would be conducted for this species. If impacts to the species from the Project are detected, mitigation would be developed by the BLM and EML.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.9.3.5.3 Residual Adverse Impacts

Residual adverse effects to vegetation would include the permanent loss of vegetative productivity from approximately 527 acres of land associated with the open pit that would not be reclaimed and a long-term change in vegetation composition (i.e., tree and shrub dominated communities to grass and forb dominated communities, potential **change in** phreatophyte vegetation **percent cover and composition**) as a result of Project development and operation.

Residual adverse effects to special status species would not occur as a result of the Project since no special status species were located within the Project Area.

3.9.3.6 Off-Site Transfer of Ore Concentrate for Processing Alternative

3.9.3.6.1 Vegetation Communities Disturbed by the Off-Site Transfer of Ore Concentrate for Processing Alternative

Although the Off-Site Transfer of Ore Concentrate for Processing Alternative would result in approximately 20 acres less surface disturbance in the piñon-juniper/big sagebrush vegetation community when compared to the Proposed Action, impacts to vegetation community types from this alternative would be similar to those for the Proposed Action since the disturbance acreage would decrease by only 0.2 percent.

- **Impact 3.9.3.6-1:** Implementation of the Off-Site Transfer of Ore Concentrate for Processing Alternative would result in the general removal of vegetation.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Impacts to phreatophyte vegetation would be similar to those under the Proposed Action.

- **Impact 3.9.3.6-2: Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities.**

  Significance of the Impact: The impact is **not** considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

The Project mining activities and vehicular traffic would affect vegetation within the immediate vicinity of the Project Area by increasing the amount of airborne particulate deposition onto vegetation surfaces. Deposition could result in lowered primary production in plants due to reduced photosynthesis and decreased water use efficiency. The potential effects on vegetation from dust would be reduced by wind and periodic precipitation, which would remove some of the accumulated dust. In addition, the implementation of the fugitive dust reduction measures outlined in the Proposed Action would reduce the impact of dust deposition on vegetation.

- **Impact 3.9.3.6-3:** Vegetation in the immediate vicinity of the Project Area could suffer periodic short-term reductions in primary production due to airborne particulate deposition onto exposed surfaces.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

The fenced area around the Project would limit BLM fire management activities by preventing normal access. The development of the Project well field in Kobeh Valley would create multiple unvegetated linear features (roads) that could be used as fire breaks in BLM fire management activities. These constructed roads could also provide additional access for potential fire management activities. Mine equipment and water resources could also be used to aid in suppression activities.

Potential impacts to the management of vegetation communities for wildland fire prevention and control as a result of Project activities would be limited as a result of the implementation of precautionary measures outlined in Sections 2.1.10 and 2.1.14.8.

- **Impact 3.9.3.6-4:** The Project would result in limitations and enhancements to the BLM's fire management activities within the vicinity of the Project Area.

  Significance of the Impact: Based on the conclusions from the analysis, the impact is not significant. **T**he following mitigation measure is proposed **for this impact**.

- **Mitigation Measure 3.9.3.6-4:** During periods of high fire danger, EML would utilize welding tents during welding activities along the pipeline or powerline routes in the Project Area.

- **Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.9.3.6-4 would be effective at reducing the potential for Project activities to result in wildland fires.

3.9.3.6.2 Special Status Plant Species

Impacts to special status plant species and their habitat as a result of the Off-Site Transfer of Ore Concentrate for Processing Alternative would be similar to those for the Proposed Action.

- **Impact 3.9.3.6-5:** Disturbance or removal of potential habitat for Beatley buckwheat and windloving buckwheat could occur as a result of the Off-Site Transfer of Ore Concentrate for Processing Alternative.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.9.3.6-6:** Potential, unsurveyed habitat for least phacelia located outside of the Project Area would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the potential habitat could potentially impact these species indirectly.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.9.3.6-7:** Occupied and potential habitat for the Monte Neva Indian paintbrush is not expected to experience water stress because it is located outside of the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. However, lowering of the water table in the occupied and potential habitat could potentially impact this species.

  Significance of the Impact: No indirect impact from the Off-Site Transfer of Ore Concentrate for Processing Alternative is expected to this species or occupied habitat because they are located outside of the predicted water table drawdown. Yearly monitoring would be conducted for this species. If impacts to the species from the Project are detected mitigation would be developed by the BLM and EML.

No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.9.3.6.3 Residual Adverse Impacts

The potential residual impacts to vegetation resources from the Off-Site Transfer of Ore Concentrate for Processing Alternative would be similar to those for the Proposed Action.

3.9.3.7 Slower, Longer Project Alternative

Impacts from the Slower, Longer Project Alternative would occur over a period approximately twice as long in duration compared to the Proposed Action. As discussed in Section 3.2.3, the surface area predicted to be impacted by the drawdown by this alternative is similar to, but slightly different than, the Proposed Action. The differences between the predicted drawdown area is illustrated on Figure 3.2.3. Impacts to vegetation as a result of the Slower, Longer Project Alternative are expected to be similar to the Proposed Action at the end of the Project.

3.9.3.7.1 Vegetation Communities Disturbed by the Slower, Longer Project Alternative

Vegetation communities impacted by the Slower, Longer Project Alternative would be the same as the Proposed Action.

- **Impact 3.9.3.7-1:** Disturbance or removal of vegetation community types would occur as a result of the Slower, Longer Project Alternative.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.9.3.7-2: Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities.**

  Significance of the Impact: The impact is **not** considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.9.3.7-3:** Vegetation in the immediate vicinity of the Project Area could suffer periodic short-term reductions in primary production due to airborne particulate deposition onto exposed surfaces.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

The fenced area around the Project would limit BLM fire management activities by preventing normal access. The development of the Project well field in Kobeh Valley would create multiple unvegetated linear features (roads) that could be used as fire breaks in BLM fire management activities. These constructed roads could also provide additional access for potential fire management activities. Mine equipment and water resources could also be used to aid in suppression activities.

Potential impacts to the management of vegetation communities for wildland fire prevention and control as a result of Project activities would be limited as a result of the implementation of precautionary measures outlined in Sections 2.1.10 and 2.1.14.8.

- **Impact 3.9.3.7-4:** The Project would result in limitations and enhancements to the BLM's fire management activities within the vicinity of the Project Area.

  Significance of the Impact: Based on the conclusions from the analysis, the impact is not significant. **T**he following mitigation measure is proposed **for this impact**.

- **Mitigation Measure 3.9.3.7-4:** During periods of high fire danger, EML would utilize welding tents during welding activities along the pipeline or powerline routes in the Project Area.

- **Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.9.3.7-4 would be effective at reducing the potential for Project activities to result in wildland fires.

3.9.3.7.2 Special Status Plant Species

Impacts to special status plant species from the Slower, Longer Project Alternative would be the same as the Proposed Action.

- **Impact 3.9.3.7-5:** Disturbance or removal of potential habitat for Beatley buckwheat and windloving buckwheat could occur as a result of the Slower, Longer Project Alternative.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.9.3.7-6:** Potential, unsurveyed habitat for least phacelia located outside of the Project Area would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the potential habitat could potentially impact these species indirectly.

  Significance of the Impact: The indirect impact of the Proposed Action to potential habitat of these species would not meet the significance criteria listed in Section 3.9.3.1.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.9.3.7-7:** Occupied and potential habitat for the Monte Neva Indian paintbrush is not expected to experience water stress because it is located outside of the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. However, lowering of the water table in the occupied and potential habitat could potentially impact this species.

  Significance of the Impact: No indirect impact of the Proposed Action is expected to this species or occupied habitat because they are located outside of the predicted water table drawdown. Yearly monitoring would be conducted for this species. If impacts to the species from the Project are detected, mitigation would be developed by the BLM and EML.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.9.3.7.3 Residual Adverse Impacts

Residual adverse impacts to vegetation would include the permanent loss of vegetative productivity from approximately 734 acres of land associated with the open pit that would not be reclaimed and a long-term change in vegetation composition (i.e., tree and shrub dominated communities to grass and forb dominated communities, potential **change in** phreatophyte vegetation **percent cover and composition**) as a result of Project development and operation.

Residual adverse effects to special status species would not occur as a result of the Project since no special status species were located within the Project Area.

3.10 Noxious Weeds, Invasive & Nonnative Species

3.10.1 Regulatory Framework

Noxious weeds are designated by state, federal, or other laws and regulations and are mandated to be prevented or controlled because of their potential to cause economic harm (e.g., affect the quality of forage on rangelands, affect cropland, or forest land productivity), environmental harm (e.g., displace native plants and natural habitats), or harm human and animal health. There are no State of Nevada listed noxious weeds found within the boundary of the Project Area. This analysis will focus on invasive plant and nonnative species. Invasive and/or nonnative plant species are generally plants that have become too extensive and widely distributed to be effectively controlled or eradicated.

3.10.1.1 Executive Order 11312: Prevention and Control of Invasive Species

Several federal laws provide direction for addressing the prevention and control of noxious weeds, invasive and nonnative species. For example, the Plant Protection Act authorizes the USDA to list weeds that have been determined to cause certain harm, including damage to agricultural or natural resources, as being "noxious weeds." EO 11312 established a national Invasive Species Council, made up of federal agencies and departments, and a supporting Invasive Species Advisory Council, composed of state, local, and private entities. The Invasive Species Council and Advisory Committee oversees and facilitates implementation of the EO, including preparation of a National Invasive Species Management Plan.

3.10.1.2 Federal Noxious and Invasive Weed Laws

A number of federal laws pertain to noxious and invasive weeds, including the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, as amended (16 U.S.C. 4701 et seq.), Lacey Act, as amended (18 U.S.C. 42), Federal Plant Pest Act (7 U.S.C. 150aa et seq.), Federal Noxious Weed Act of 1974, as amended by the Food, Agriculture, Conservation, and Trade Act of 1990 (Section 1453 "Management of Undesirable Plants on Federal Lands" U.S.C. 2801 et seq.), the Carlson-Foley Act of 1968 (Public Law 90-583), and Federal EO 11312 released February 3, 1999. In Nevada, the BLM is primarily concerned with the control of State of Nevada listed noxious weed infestations and their dispersal on public lands. The BLM, USDA and the Nevada Department of Agriculture (NDOA) maintain lists of noxious weeds of economic or ecological concern.

3.10.1.3 Nevada Noxious Weed Laws

Chapter 555 of the NRS pertains to noxious weeds. The NDOA has responsibility for jurisdiction, management, and enforcement of the state's noxious weed law. Plants on Nevada's noxious weeds list are mandated to be controlled on both private and public land. The NDOA also maintains and updates a list of state listed noxious weeds, which can be found at the following web link, (http://agri.nv.gov/nwac/PLANT_NoxWeedList.htm). Chapter 555 also calls for the establishment of county "Weed Control Districts" with the responsibility to control and eradicate noxious weeds. The legislature declared that it is the responsibility of each owner or occupier of land in Nevada to control noxious weeds on their land, but finds that in certain areas this responsibility can best be discharged through control by organized Weed Districts. **In Eureka County, weed control is primarily discharged through Eureka County weed control under the County Department of Natural Resources and through the Diamond Valley Weed Control District.**

3.10.2 Affected Environment

3.10.2.1 Study Methods

Noxious weed, invasive and nonnative weed surveys were conducted by SRK in a majority of the Project Area between June 2005 through August 2006. The noxious weed, invasive and nonnative species surveys were conducted concurrently with the vegetation and wildlife biological baseline surveys (SRK 2007b, 2007c). The Kobeh Valley portion of the Project Area was surveyed for noxious weeds, invasive and nonnative species by Great Basin Ecology in July 2008 (Great Basin Ecology 2008).

3.10.2.2 Existing Conditions

No infestations of NDOA listed noxious weeds were observed in the Project Area. Cheatgrass (an invasive nonnative annual grass species) was observed as an understory component of most of the vegetation types; however, no large cheatgrass monocultures were observed (SRK 2007b).Other invasive nonnative plants species observed within the Project Area were halogeton and Russian thistle (*Salsola kali*). These two species are not considered noxious weeds by the State of Nevada and, therefore, not listed on the NDOA's noxious weed list.

Although no noxious weeds were observed in the Project Area during the initial 2007 survey, weedy annual species including cheatgrass and halogeton were identified within the Project Area, weedy annual species including cheatgrass and halogeton were identified within the Project Area, and Russian thistle was located near the Project Area. Although Scotch thistle (*Onopordum acanthium*), hoary cress (*Cardaria draba*), and salt cedar (*Tamarix ramosissima*) have been mapped and treated by Eureka County in the vicinity, these species were not observed during initial surveys of the Project Area. Subsequently, hoary cress has been observed along roadsides within the Project boundary.

3.10.3 Environmental Consequences and Mitigation Measures

3.10.3.1 Significance Criteria

Based upon BLM Manual 9015 guidelines, the Proposed Action or alternatives would be considered to have a significant effect on noxious weed management if it resulted in the following:

- An increased likelihood of the introduction of noxious weed species or invasive, nonnative species, into a relatively weed-free area at moderate or high ecological risk as a result of a lack of preventative action; or
- An expansion of noxious weed infestation(s) within and outside of the Project Area into relatively weed-free areas at moderate or high ecological risk.

Ecological risk is the level of likelihood and consequence of adverse effects on the environment. A determination of a Risk Rating (none, low, moderate, or high) is made through the Risk Assessment process outlined in Appendix 1 of BLM Manual 9015. Areas with a moderate or high risk rating have the following: a) noxious weed infestations immediately adjacent to or within the Project Area; b) activities associated with the Project that are likely to result in some areas becoming infested; and c) there are probable adverse effects on native plant communities within, and possibly outside of, the Project Area.

3.10.3.2 Assessment Methodology

The assessment of the effects of the Project on noxious weed management is based on a qualitative analysis of the potential for noxious weeds, invasive and nonnative species to become introduced or established within the Project Area as a result of increased activity disturbance and reclamation. The effects of the Project are determined to be significant or not significant based on the applicable significance criteria listed in Section 3.10.3.1.

3.10.3.3 Proposed Action

Invasive, nonnative plant species readily invade areas that have been disturbed and which typically lack or have minimal vegetation cover. Development and operation of the Project would remove or disturb 8,3**55** acres of vegetation over the 44-year mine life, of which 734 acres associated with the open pit would not be reclaimed.

The **applicant committed practices** outlined in Section 2.1.14.**8** would substantially reduce the introduction and spread of noxious weeds, invasive and nonnative species. The **applicant committed practices** include the implementation of a noxious weed monitoring and control plan

during construction and throughout operations. Implementation of this plan would be coordinated with the BLM**, Eureka County Natural Resource Department, and Diamond Valley Weed Control District.**

Reclamation would also reduce the establishment of noxious weeds in the Project Area. Due to concurrent reclamation, the total acreage of vegetation disturbed would not occur all at one time; however, minor populations of weedy annual species (e.g., halogeton and cheatgrass) may become established in localized areas for short periods of time. Growth media stockpiles would be reclaimed with an interim seed mix to stabilize the growth media, reduce soil erosion, and minimize the potential for the establishment of noxious weeds. Successful reclamation of mine related surface disturbance areas would result in the establishment of a permanent vegetative cover, which would minimize the potential establishment of noxious weeds in the long term. Although the open pit would not be reclaimed, noxious weeds would not likely become established in the open pit due to the absence of soil and the formation of a pit lake in the long term. As described in Section 2.1.14, EML would utilize certified weed-free seed mixes for reclamation. Weed control practices would be implemented in coordination with the BLM to limit the spread of noxious weeds, if they appear in the Project Area.

- **Impact 3.10.3.3-1:** Implementation of the Proposed Action could result in the introduction and spread of noxious weeds, invasive and nonnative species.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.10.3.3-2:** Phreatophyte vegetation, riparian corridors, and wet meadows would potentially experience **changes in species composition and density due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Noxious weeds as well as invasive and nonnative species associated with existing surface disturbance or those transported into the phreatophytes, riparian corridors, and wet meadows could potentially invade areas that experience changes in species composition and density**.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.10.3.3.1 Residual Adverse Impacts

The Proposed Action would result in the unavoidable disturbance of approximately 8,3**55** acres of vegetation over the 44-year mine life, which would produce conditions conducive to supporting noxious weeds. Implementation of reclamation and the noxious weed monitoring and control plan would reduce or eliminate the chance of noxious weed establishment and infestation **(EML 2006, Appendix 13)**.

3.10.3.4 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and associated impacts to noxious weed management would not occur. EML would continue existing activities under previously permitted Notices for a total of 3**5** acres of surface disturbance and the area would remain available for future mineral development or for other purposes as approved by the BLM.

3.10.3.4.1 Residual Adverse Impacts

There are no residual adverse impacts from noxious weeds associated with the No Action Alternative.

3.10.3.5 Partial Backfill Alternative

Impacts from noxious weeds would be similar to those described for the Proposed Action; however, the Partial Backfill Alternative would involve the partial backfilling of the open pit to eliminate the pit lake and the floor of the backfilled open pit would be reclaimed with growth media and seeded. The **applicant committed practices** outlined in Section 2.1.**14.8** and reclamation would reduce the potential for noxious weeds to establish in the Project Area. Although the Proposed Action would have 734 acres that would remain unvegetated in the open pit, under this alternative approximately 527 acres would remain unvegetated following Project completion and reclamation. Therefore, impacts from noxious weeds would be similar to, but slightly less than, those described for the Proposed Action.

- **Impact 3.10.3.5-1:** Implementation of the Partial Backfill Alternative could result in the introduction and spread of noxious weeds, invasive and nonnative plant species.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.10.3.5-2:** Phreatophyte vegetation, riparian corridors, and wet meadows would potentially experience **changes in species composition and density due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Noxious weeds as well as invasive and nonnative species associated with existing surface disturbance or those transported into the phreatophytes, riparian corridors, and wet meadows could potentially invade areas that experience changes in species composition and density**.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.10.3.5.1 Residual Adverse Impacts

The Partial Backfill Alternative would result in the unavoidable disturbance of approximately 8,3**55** acres of vegetation over the 44-year life of the mine, which would produce conditions conducive to supporting noxious weeds. Implementation of reclamation and the noxious weed monitoring and control plan would reduce or eliminate the chance of noxious weed establishment and infestation.

3.10.3.6 Off-Site Transfer of Ore Concentrate for Processing Alternative

Impacts from noxious weeds would be similar to those described for the Proposed Action; however, the Off-Site Transfer of Ore Concentrate for Processing Alternative would result in approximately 20 acres less surface disturbance. The **applicant committed practices** outlined in Section 2.1.14.**8** and reclamation would reduce the potential for noxious weeds to establish in the Project Area. When compared to the Proposed Action, impacts from noxious weeds as a result of this alternative would be similar to those for the Proposed Action since the acreage of surface disturbance would decrease by only 0.2 percent.

- **Impact 3.10.3.6-1:** Implementation of the Off-Site Transfer of Ore Concentrate for Processing Alternative could result in the introduction and spread of noxious weeds, invasive and nonnative plant species.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.10.3.6-2:** Phreatophyte vegetation, riparian corridors, and wet meadows would potentially experience **changes in species composition and density due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Noxious weeds as well as invasive and nonnative species associated with existing surface disturbance or those transported into the phreatophytes, riparian corridors, and wet meadows could potentially invade areas that experience changes in species composition and density.**

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.10.3.6.1 Residual Adverse Impacts

The Off-Site Transfer of Ore Concentrate for Processing Alternative would result in the unavoidable disturbance of approximately **8,335** acres of vegetation over the 44-year mine life of which 734 acres associated with the open pit would not be reclaimed, which would produce conditions conducive to supporting noxious weeds. Reclamation and the noxious weed monitoring and control plan would reduce or eliminate the chance of noxious weed establishment and infestation.

3.10.3.7 Slower, Longer Project Alternative

Impacts from noxious weeds would be similar to those described for the Proposed Action; however, the Slower, Longer Project Alternative would occur over a period approximately twice as long in duration compared to the Proposed Action and the surface area predicted to be impacted by the drawdown by this alternative is slightly different than the Proposed Action. The differences between the predicted drawdown area is illustrated on Figure 3.2.28. The **applicant committed practices** outlined in Section 2.1.15 and reclamation would reduce the potential for noxious weeds to establish in the Project Area. Impacts from noxious weeds and invasive, nonnative species as a result of the Slower, Longer Project Alternative are expected to be similar to the Proposed Action at the end of the Project.

- **Impact 3.10.3.7-1:** Implementation of the Slower, Longer Project Alternative could result in the introduction and spread of noxious weeds, invasive and nonnative plant species.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.10.3.7-2:** Phreatophyte vegetation, riparian corridors, and wet meadows would potentially experience **changes in species composition and density due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Noxious weeds as well as invasive and nonnative species associated with existing surface disturbance or those transported into the phreatophytes, riparian corridors, and wet meadows could potentially invade areas that experience changes in species composition and density.**

  Significance of the Impact: The impact is **not considered significant.**

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.10.3.7.1 Residual Adverse Impacts

The Slower, Longer Project Alternative would result in the unavoidable disturbance of approximately 8,3**55** acres of vegetation over the extended mine life, which would produce conditions conducive to supporting noxious weeds. Implementation of reclamation and the noxious weed monitoring and control plan would reduce or eliminate the chance of noxious weed establishment and infestation.

3.11 Wetlands and Riparian Zones

3.11.1 Regulatory Framework

This section discusses the regulatory definition of wetlands, as well as the laws and regulations that may apply to wetland and riparian resources potentially affected by the Project. Wetland communities are considered valuable natural resources that provide habitat for a variety of

dependent plant and wildlife species. Riparian/wetland areas also provide ecosystem services and values that are critical within BLM's multiple use mandate. The USACE and the EPA have policies and laws that regulate federally jurisdictional wetlands. However, there are no federally jurisdictional wetlands within the Project Area. As a result, federal management of wetlands is through the BLM on public lands and through State of Nevada Water Law relative to the use of water from wetlands. State of Nevada Water Law is discussed in Section 3.2.

3.11.1.1 Definition of Wetlands

Wetlands are defined by the USACE and EPA in 40 CFR 230.3 and 33 CFR 328.3 as those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal conditions, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

The BLM defines riparian as: "A riparian area is an area of land directly influenced by permanent water. It has visible vegetation or physical characteristics reflective of permanent water influence. Lake shores and stream banks are typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil."

In 1991 the BLM Director approved the *Riparian-Wetland Initiative for the 1990's*, which establishes national goals and objectives for managing riparian-wetland resources on public lands. One of the chief goals of this initiative is to restore and maintain riparian-wetland areas so that 75 percent or more are in proper functioning condition (PFC) by 1997 (BLM 1991). The overall objective of this goal is to achieve an advanced ecological status, except where resource management objectives, including PFC, would require an earlier successional stage, thus providing the widest variety of vegetation and habitat diversity for wildlife, fish, and watershed protection. This objective is important to remember because riparian-wetland areas would function properly long before they achieve an advanced ecological status. The *Riparian-Wetland Initiative for the 1990's* also includes a strategy to focus management on the entire watershed. Entire watershed condition is an important component in assessing whether a riparian-wetland area is functioning properly.

The USACE's Wetland Delineation Manual (USACE 1987) defines a three parameter approach to delineating jurisdictional wetlands. In order for an area to be considered a jurisdictional wetland it must support each of the three parameters: hydric soils; wetland vegetation; and wetland hydrology.

3.11.1.2 Executive Order 11990: Protection of Wetlands

The federal government supports a policy of minimizing "the destruction, loss, or degradation of wetlands" (EO 11990, May 24, 1977). The EO directs all federal agencies to refrain from assisting or giving financial support to projects that encroach on public or privately owned wetlands.

3.11.1.3 Federal Land Policy and Management Act

The FLPMA directs the BLM to manage public lands in a manner that would provide for multiple use and at the same time protect natural resources for generations to come. In addition to FLPMA, numerous laws, regulations, policies, EOs, and Memoranda of Understanding (MOUs) direct the BLM to manage its riparian/wetland areas for the benefit of the nation and the economy. BLM Manual 1737 for Riparian Wetland Area Management identifies marshes, shallow swamps, lakeshores, bogs, muskegs, wet meadows, estuaries, and riparian areas as wetlands.

3.11.2 Affected Environment

3.11.2.1 Study Methods

On September 21, 2005, SRK conducted a Routine On-Site Wetland Delineation (SRK 2007e) to determine the presence or absence of jurisdictional and non-jurisdictional wetlands within the Project Area in accordance with the following: Section 404 of the CWA; the USACE Wetland Delineation Manual (USACE 1987); and the Sacramento District, Reno, Nevada, field office Minimum Standards for Acceptance of Preliminary Wetland Delineations (October 11, 1994), revised November 30, 2001. If present, the extent of the wetland was determined. Potential wetlands within the Project Area are supported by spring or seep flow, and ephemeral surface flows. On July 15 through 17, 2011, JBR Environmental Consultants, Inc. (JBR) conducted a supplemental spring and riparian area investigation (JBR 2011).

Prior to the Routine On-Site Wetland Delineation, aerial photographs and topographic map tools were reviewed for indications of open water, springs, and ephemeral, intermittent, and perennial drainages. The Soil Survey of Eureka and Part of White Pine Counties, prepared by the NRCS was reviewed prior to visiting the site (NRCS 1998).

3.11.2.2 Existing Conditions

In the Routine On-Site Wetland Delineation it was determined that no waters of the U.S. are located in the Project Area. With no jurisdictional waters present in the Project Area, USACE jurisdiction does not extend to the wetlands in the Project Area. A number of non-jurisdictional wetlands, or riparian areas, were identified in and surrounding the Project Area. Wetlands identified in the Project Area were recognized by the presence of facultative wet/obligate wetland plant species, ordinary high water mark (OHWM) indicators, and hydric soil indicators. The delineation identified 1,400 square feet (0.03 acre) of wetlands associated with Garden Spring (597) outside of the Project Area. During the July 2011 spring and seep survey, 0.22 acre of riparian vegetation was located within the Project Area associated with the Zinc adit (839) (JBR 2011). The springs and associated riparian vegetation identified in the Project Area and vicinity are shown on Figure 3.9.1.

3.11.3 Environmental Consequences and Mitigation Measures

3.11.3.1 Significance Criteria

Impacts to wetlands and riparian zones would be considered significant if the Proposed Action or alternatives resulted in any of the following:

- Violations of EO 11990 - Protection of Wetlands;
- Effects that are inconsistent with the objectives set forth in the BLM Riparian Initiative; or
- Eliminate, reduce, or adversely affect wetlands, riparian, or phreatophytic vegetation areas within the area directly or indirectly affected by Project activities.

3.11.3.2 Assessment Methodology

Potential effects on wetlands and riparian zones can be categorized as direct and indirect, as well as short term (i.e., during the life of the Project) and long term. Direct effects on wetlands and riparian zones could include removal or disturbance of riparian and wetland communities. Indirect effects could result from water table drawdown as a result of mine dewatering systems and well field pumping for process water. Short-term impacts are those that could occur during Project implementation and until reclamation is complete. Long-term impacts are those occurring after reclamation is complete. The effects are determined to be significant or not significant based on the applicable significance criteria listed in Section 3.11.3.1.

3.11.3.3 Proposed Action

Riparian and wetland communities that provide important habitat for local and migratory wildlife and fish species are considered sensitive resources, providing ecosystem services such as nutrient cycling, and also providing values such as irrigation and fisheries and are of concern to federal and state agencies. Riparian systems also provide water and habitat to wild horses and water to livestock. There are no jurisdictional wetlands or any other wetlands within the proposed areas of disturbance. Impacts to springs and stream water flows are discussed in Section 3.2.

■ **Impact 3.11.3.3-1:** The Project would not result in the removal or disturbance **(direct impact)** of wetlands in the Project Area.

Significance of the Impact: The impact is not considered significant.

No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

The mine dewatering system and pumping of the production well field is expected to drawdown the ground water table in an area surrounding the open pit. As discussed in Section 3.2, modeling results show that significant water table drawdowns in the aquifer would occur in an area measuring approximately 232 square miles around the Project Area including the northeast quadrant of Kobeh Valley and the southernmost fringe of the Roberts Mountains.

Phreatophytes that may be impacted as a result of the Proposed Action aquifer drawdown occur in Kobeh Valley. In the central Kobeh Valley, as discussed in Section 3.2 the shallow ground water (between zero and ten feet bgs) at the valley floor supports substantial areas of phreatophyte vegetation (Figure 3.9.2). As illustrated on Figure 3.2.9, approximately 4,122 acres of phreatophyte vegetation were mapped as occurring within the area predicted to be impacted by aquifer drawdown. More recent data from satellite imagery indicate that as many 28,500 acres of phreatophytes are located in Kobeh Valley (these data will be finalized upon publication) (USGS 2011). In order to verify the extent of phreatophytes

potentially impacted by the Project, the soil associations in Kobeh Valley were reviewed to determine which soils are associated with phreatophytes. This review identified Bubus loam (1010), Bubus-Dianev (1012), Ocala silt loam (161), Dianev silt loam (250), Brinnum silt loam (400), and Beanflat silt loam (410). The extent of these soils in Kobeh Valley is similar to the extent of phreatophytes identified in the preliminary results from the USGS Open-File Report 2011-1089 (USGS 2011), and are distributed southwest of the Project Area and overlap modeled ground water drawdown contours up to 70 feet in depth. However, the majority of phreatophytes that would be impacted are located in the area predicted to experience a ten- to 20-foot drawdown. Where the phreatophytes would be impacted as a result of ground water drawdown, the increase in the depth to ground water is expected to result in impacts to the phreatophyte vegetation through a change in vegetation composition and cover.

Impacts to other vegetation communities as a result of drawdown are not expected. The predicted ten-foot water drawdown contour for the Proposed Action does not intercept any known phreatophyte vegetation within Diamond Valley, Antelope Valley, or Pine Valley.

- **Impact 3.11.3.3-2: Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities.**

  Significance of the Impact: The impact is **not** considered significant**.**

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Direct impacts to the 0.22 acre of riparian vegetation associated with the Zinc adit are expected from the Project.

Water table drawdown would have a negative effect on wetland vegetation species dependent on seeps or springs. Lowering of the water table in the area where these plants occur would potentially cause a decline in the wetland community and the structure, functionality, and values offered by these systems. As the water table is lowered, the soils may dry out and these plants may decline due to water stress. Wetland plants that die as a result of water stress would likely be replaced by vegetation species that are not dependent on spring or seep water.

T**here are t**wenty-two existing springs**,** 7.7 miles of perennial streams in the Roberts Creek and Henderson Creek drainage**, and 61.4 acres of riparian areas associated with these creeks that** occur within the ten-foot drawdown contour (Figure 3.9.2). Table 3.2-6 in the Water Resources - Water Quantity Section identifies those springs that may be affected as a result of the Proposed Action. The total area of riparian vegetation that may be indirectly affected by the decline in the water table is approximately four acres associated with springs and **61.4** acres associated with the 7.7 miles of perennial streams.

- **Impact 3.11.3.3-3:** Vegetation dependent on springs, seeps, and perennial streams (i.e., riparian vegetation) would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water

table. Lowering of the water table in the area where these plants are located would potentially cause a decline in the riparian vegetation community. **Additionally, direct impacts to the 0.22 acre of riparian vegetation associated with the Zinc adit are expected from the Project.**

Significance of the Impact: Potential impacts to riparian vegetation areas within the area directly or indirectly affected by Project activities would be monitored as outlined in Section 2.1.15 and in the Plan. The impact is considered potentially significant.

- **Mitigation Measure 3.11.3.3-3:** As stated in Mitigation Measure 3.2.3.3-2a specific mitigation for the two perennial stream segments and 22 perennial or potentially perennial spring sites are outlined in Table 3.2-9. Implementation of the mitigation outlined in this table would result in up to 46.3 acres of additional surface disturbance associated with the pipeline construction and maintenance. This supplemental water should sustain riparian vegetation. **EML, in coordination with the BLM, would identify sites for mitigation in the area affected and implement mitigation measures at a three to one ratio with local cuttings, plugs, or seeds within one year of direct disturbance. EML would monitor these sites on an annual basis for at least three years after treatment to ensure effectiveness.**

- **Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.2.3.3-2a is designed to address the specific spring or surface water that is affected, which enhances the effectiveness of the mitigation. In addition, a variety of approaches to mitigation can be used within these measures to achieve the objective. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by restoring or enhancing surface flows, and because the measures would be reviewed and addressed by the BLM. Mitigation Measure 3.11.3.3-3 would reduce impacts to the loss of riparian vegetation during Project activities. Replacement with local cuttings, plugs, or seeds would ensure no long-term impacts to the loss of riparian vegetation.

3.11.3.3.1 Residual Adverse Impacts

Following Project completion and reclamation, residual adverse impacts to riparian zones from the Proposed Action would consist of a gradual return of flows to those springs, seeps, and perennial streams that experienced reduced flows from the ground water pumping. In addition, up to 0.22 acre of riparian vegetation within the Project Area would be removed through Project activities.

3.11.3.4 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and associated impacts to wetlands and riparian zones would not occur. EML would continue existing activities under previously permitted Notices, and the area would remain available for future mineral development or for other purposes as approved by the BLM.

3.11.3.4.1 Residual Adverse Impacts

There are no residual adverse impacts to wetlands and riparian zones associated with the No Action Alternative.

3.11.3.5 Partial Backfill Alternative

Although the Partial Backfill Alternative would involve the partial backfilling of the open pit to eliminate the pit lake and the floor of the open pit (approximately 527 acres) would be reclaimed with growth media and seeded, the impacts to wetland and riparian areas would be similar to those described for the Proposed Action. The absence of water in the open pit would increase the amount of water available to wetlands and riparian areas as compared to the Proposed Action, particularly related to areas close to the open pit. Under this alternative, approximately 100 afy in evaporation from the pit lake would be prevented, and presumably that water would affect ground water resources.

- **Impact 3.11.3.5-1:** The Partial Backfill Alternative would not result in the possible removal or disturbance of wetlands in the Project Area.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.11.3.5-2: Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities.**

  Significance of the Impact: The impact is **not** considered significant**.**

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.11.3.5-3:** Vegetation dependent on springs, seeps, and perennial streams (i.e., riparian vegetation) would potentially experience water stress due to the water table drawdown associated with mine dewatering and subsequent filling of the open pit. Lowering of the water table in the area where these plants are located would potentially cause a decline in the riparian vegetation community. **Additionally, direct impacts to the 0.22 acre of riparian vegetation associated with the Zinc adit are expected from the Project.**

  Significance of the Impact: Potential impacts to riparian vegetation areas within the area directly or indirectly affected by Project activities would be monitored as outlined in Section 2.1.15 and the Plan. The impact is considered potentially significant.

- **Mitigation Measure 3.11.3.5-3:** As stated in Mitigation Measure 3.2.3.3-2a, specific mitigation for the two perennial stream segments and 22 perennial or potentially

perennial spring sites are outlined in Table 3.2-9. Implementation of the mitigation outlined in this table would result in up to 46.3 acres of additional surface disturbance associated with the pipeline construction and maintenance. This supplemental water should sustain riparian vegetation. **EML, in coordination with the BLM, would identify sites for mitigation in the area affected and implement mitigation measures at a three to one ratio with local cuttings, plugs, or seeds within one year of direct disturbance. EML would monitor these sites on an annual basis for at least three years after treatment to ensure effectiveness.**

- **Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.2.3.3-2a is designed to address the specific spring or surface water that is affected, which enhances the effectiveness of the mitigation. In addition, a variety of approaches to mitigation can be used within these measures to achieve the objective. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by restoring or enhancing surface flows, and because the measures would be reviewed and addressed by the BLM. Mitigation Measure 3.11.3.5-3 would reduce impacts to the loss of riparian vegetation during Project activities. Replacement with local cuttings, plugs, or seeds would ensure no long-term impacts to the loss of riparian vegetation.

3.11.3.5.1 Residual Adverse Impacts

Following Project completion and reclamation, residual adverse impacts to wetland and riparian zones from the Partial Backfill Alternative would consist of a gradual return of flows to those springs, seeps, and perennial streams that had reduced flows from the ground water pumping. In addition, up to 0.22 acre of riparian vegetation within the Project Area would be removed through Project activities.

3.11.3.6 Off-Site Transfer of Ore Concentrate for Processing Alternative

Although the Off-Site Transfer of Ore Concentrate for Processing Alternative would result in approximately 20 acres less surface disturbance compared to the Proposed Action, impacts to riparian areas from this alternative would be similar to those for the Proposed Action.

- **Impact 3.11.3.6-1:** The Off-Site Transfer of Ore Concentrate for Processing Alternative would not result in the removal or disturbance of wetlands in the Project Area.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.11.3.6-2: Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities.**

Significance of the Impact: The impact is **not** considered significant.

No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.11.3.6-3:** Vegetation dependent on springs, seeps, and perennial streams (i.e., riparian vegetation) would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area where these plants are located would potentially cause a decline in the riparian vegetation community. **Additionally, direct impacts to the 0.22 acre of riparian vegetation associated with the Zinc adit are expected from the Project.**

  Significance of the Impact: Potential impacts to riparian vegetation areas within the area directly or indirectly affected by Project activities would be monitored as outlined in Section 2.1.15 and the Plan. The impact is considered potentially significant.

- **Mitigation Measure 3.11.3.6-3:** As stated in Mitigation Measure 3.2.3.3-2a, specific mitigation for the two perennial stream segments and 22 perennial or potentially perennial spring sites are outlined in Table 3.2-9. Implementation of the mitigation outlined in this table would result in 46.3 acres of additional surface disturbance associated with the pipeline construction and maintenance. This supplemental water should sustain riparian vegetation. **EML, in coordination with the BLM, would identify sites for mitigation in the area affected and implement mitigation measures at a three to one ratio with local cuttings, plugs, or seeds within one year of direct disturbance. EML would monitor these sites on an annual basis for at least three years after treatment to ensure effectiveness.**

- **Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.2.3.3-2a is designed to address the specific spring or surface water that is affected, which enhances the effectiveness of the mitigation. In addition, a variety of approaches to mitigation can be used within these measures to achieve the objective. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by restoring or enhancing surface flows, and because the measures would be reviewed and addressed by the BLM. Mitigation Measure 3.11.3.5-3 would reduce impacts to the loss of riparian vegetation during Project activities. Replacement with local cuttings, plugs, or seeds would ensure no long-term impacts to the loss of riparian vegetation.

3.11.3.6.1 Residual Adverse Impacts

Following Project completion and reclamation, residual adverse impacts to wetland and riparian zones from the Off-Site Transfer of Ore Concentrate for Processing Alternative would consist of a gradual return of flows to those springs, seeps, and perennial streams that had reduced flows from the ground water pumping. In addition, up to 0.22 acre of riparian vegetation within the Project Area would be removed through Project activities.

3.11.3.7 Slower, Longer Project Alternative

Impacts from the Slower, Longer Project Alternative would occur over a period approximately twice as long in duration compared to the Proposed Action. As discussed in Section 3.2.3, the surface area predicted to be impacted by the drawdown by this alternative is similar to, but slightly different than, the Proposed Action. The differences between the predicted drawdown area is illustrated on Figure 3.2.28. Impacts to riparian vegetation as a result of the Slower, Longer Project Alternative are expected to be similar to the Proposed Action at the end of the Project.

- **Impact 3.11.3.7-1:** The Slower, Longer Project Alternative would not result in the removal or disturbance of wetlands in the Project Area.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.11.3.7-2: Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities.**

  Significance of the Impact: The impact is **not** considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.11.3.7-3:** Vegetation dependent on springs, seeps, and perennial streams (i.e., riparian vegetation) would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area where these plants are located would potentially cause a decline in the riparian vegetation community. **Additionally, direct impacts to the 0.22 acre of riparian vegetation associated with the Zinc adit are expected from the Project.**

  Significance of the Impact: Potential impacts to riparian vegetation areas within the area directly or indirectly affected by Project activities would be monitored as outlined in the Plan. The impact is considered potentially significant.

- **Mitigation Measure 3.11.3.7-3:** As stated in Mitigation Measure 3.2.3.3-2a, specific mitigation for the two perennial stream segments and 22 perennial or potentially perennial spring sites are outlined in Table 3.2-9. Implementation of the mitigation outlined in this table would result in up to 46.3 acres of additional surface disturbance associated with the pipeline construction and maintenance. This supplemental water should sustain riparian vegetation. **EML, in coordination with the BLM, would identify sites for mitigation in the area affected and implement mitigation measures at a three to one ratio with local cuttings, plugs, or seeds within one year of direct**

disturbance. EML would monitor these sites on an annual basis for at least three years after treatment to ensure effectiveness.

- **Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.2.3.3-2a is designed to address the specific spring or surface water that is affected, which enhances the effectiveness of the mitigation. In addition, a variety of approaches to mitigation can be used within these measures to achieve the objective. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by restoring or enhancing surface flows, and because the measures would be reviewed and addressed by the BLM. Mitigation Measure 3.11.3.5-3 would reduce impacts to the loss of riparian vegetation during Project activities. Replacement with local cuttings, plugs, or seeds would ensure no long-term impacts to the loss of riparian vegetation.

3.11.3.7.1 Residual Adverse Impacts

Following completion and reclamation, residual adverse impacts to wetland and riparian zones from the Slower, Longer Project Alternative would consist of a gradual return of flows to those springs, seeps, and perennial streams that experienced reduced flows from the ground water pumping. In addition, up to 0.22 acre of riparian vegetation within the Project Area would be removed through Project activities.

3.12 Livestock Grazing and Production

3.12.1 Regulatory Framework

BLM Standards and Guidelines for Livestock Grazing

The BLM has established Standards and Guidelines approved by the Secretary of the Interior (43 CFR 4180). The purpose of these Standards and Guidelines is to ensure that BLM administration of grazing helps preserve currently healthy conditions and restores healthy conditions of rangelands (BLM 2001).

BLM Resource Management Plan

The RMP that covers the Project Area includes rangeland programs that authorize livestock grazing on public lands (43 CFR 1601.0-5(b) and CFR 4100.08). The regulations require that the BLM manage livestock grazing on public lands under the principles of multiple use and sustained yield. To accomplish this, rangeland has been broken down into controllable land areas called allotments to manage both short- and long-term objectives for livestock grazing. Allotments are leased to permittees for a defined period of time. **BLM MLFO allotments are managed to achieve Northeast Great Basin Resource Advisory Council standards and guidelines**. They are evaluated periodically by the BLM to determine whether management goals are being met (BLM 2001).

3.12.2 Affected Environment

3.12.2.1 Study Methods

This section includes a discussion of existing grazing allotments, types and classes of livestock, and active grazing preferences, as well as the current grazing practices and management strategies within the Project Area.

3.12.2.2 Existing Conditions

The Project Area is located within six BLM grazing allotments: Lucky C; Roberts Mountain; Romano; Ruby Hill; Shannon Station; and 3 Bars (Figure 3.12.1). Although not located within the Project Area footprint, the Santa Fe/Ferguson Allotment is located within the maximum extent ten-foot ground water drawdown contour and is included in Table 3.12-1 below. **Associated with each of these seven allotments are private lands that are used for livestock grazing and production.** Season of use and type of livestock permitted on the seven allotments are detailed in Table 3.12-1.

Table 3.12-1: Livestock Grazing Permits for the Grazing Allotments Located within the Project Area and Ten-foot Ground Water Drawdown Contour

Grazing Allotment	Type of Livestock	Season of Use	Active Preference (AUMs)
Lucky C	Cattle	4/15 through 2/28	3,054
		Subtotal	**3,054**
Roberts Mountain	Cattle	3/01 through 2/28	7,314
	Sheep	4/10 through 10/15	2,310
		Subtotal	**9,624**
Romano	Cattle	5/01 through 12/31	2,887
		Subtotal	**2,887**
Ruby Hill	Cattle	3/16 through 8/29	275
	Sheep	5/1 through 9/30	1,011
		Subtotal	**1,286**
Shannon Station	Cattle	4/1 through 2/28	2,520
		Subtotal	**2,520**
3 Bars	Cattle	3/1 through 2/28	4,111
	Sheep	3/1 through 2/28	1,729
		Subtotal	**5,840**
Santa Fe/Ferguson	Cattle	3/1 through 12/1	2,767
	Sheep	3/1 through 12/1	1,227
		Subtotal	**3,994**
		TOTAL	**29,205**

The Lucky C Allotment includes approximately 108,666 acres of public land. The active grazing preference for the allotment is 3,054 animal unit months (AUMs) for cattle, or approximately

36 acres per AUM and is under a rotational grazing system. An AUM is the amount of forage **necessary for the sustenance of one cow or its equivalent for a period of one month**. A total of **909.5** acres of the Lucky C Allotment are located in the powerline portion of the Project Area. **In addition, the ten-foot drawdown contour overlaps with the phreatophytes located within this allotment (Figure 3.12.1). According to Figure 3.12.1, this area would cover 3,143 acres (2.89 percent of this allotment).**

The Roberts Mountain Allotment includes approximately 151,060 acres of public land. The active grazing preference for the allotment is 9,624 AUMs for cattle and sheep, or on average approximately 16 acres per AUM. The allotment is currently under a rotation grazing system. A total of 7,954 acres of the Roberts Mountain Allotment are located in the fenced portion of the Project Area (of this, 1,365 acres are located in the Henderson pasture and 6,589 acres in the Nichols pasture).

The Romano Allotment consists of 76,070 acres of public lands with an active grazing preference of 2,887 AUMs for cattle, or approximately 26 acres per AUM (although AUMs/acre vary depending on pastures). This allotment is currently under a rotation grazing system. A total of 6,252 acres of the Romano Allotment are located in the fenced portion of the Project Area.

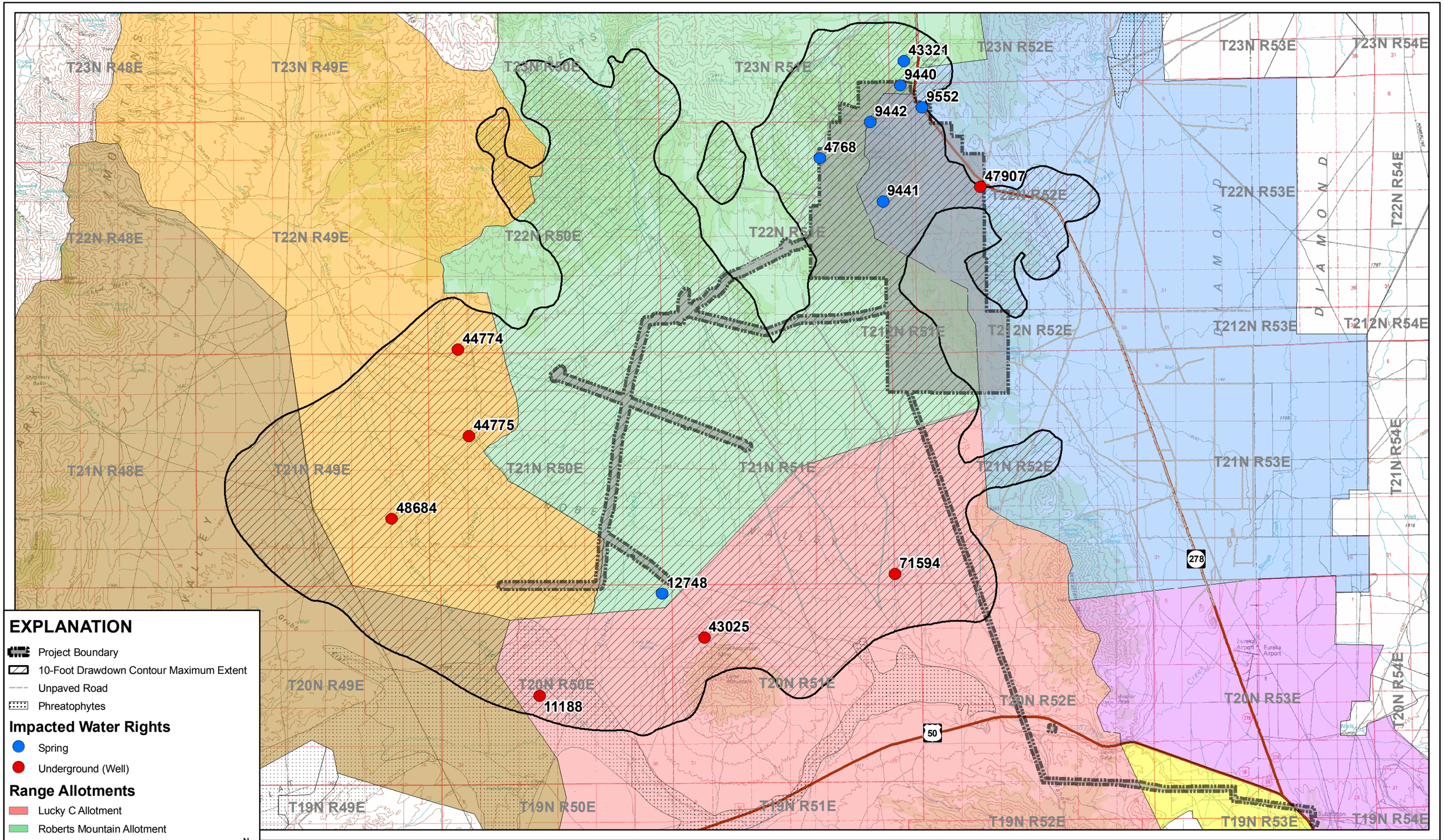
The Ruby Hill Allotment includes approximately 14,659 acres of public land. The active grazing preference for the allotment is 1,286 AUMs for cattle and sheep, or approximately 11 acres per AUM. A total of **317.7** acres of the Ruby Hill Allotment are located in the powerline portion of the Project Area.

The Shannon Station Allotment includes approximately 32,888 acres of public land. The active grazing preference for the allotment is 2,520 AUMs for cattle, or approximately 13 acres per AUM. The allotment is currently under a rotation grazing system. A total of **65.1** acres of the Shannon Station Allotment is located in the powerline portion of the Project Area.

The 3 Bars Allotment includes approximately 76,740 acres of public land. The active grazing preference for the allotment is 5,840 AUMs for cattle and sheep, or approximately 13 acres per AUM. The allotment is currently under a rotation grazing system. A total of 1,157 acres of the 3 Bars Allotment is located in the well field portion of the Project Area. **In addition, the ten-foot drawdown contour overlaps with the phreatophytes located within this allotment (Figure 3.12.1). According to Figure 3.12.1, this area would cover five acres (0.007 percent of this allotment).**

In addition to the six allotments discussed above, the ten-foot drawdown contour **overlaps with the phreatophytes located in** a seventh allotment, the Santa Fe/Ferguson Allotment (Figure 3.12.1). **According to Figure 3.12.1, this area would cover 974 acres (1.2 percent of the allotment).** The Santa Fe/Ferguson Allotment includes approximately 84,375 acres of public land. The active grazing preference for the allotment is 3,994 AUMs for cattle and sheep, or approximately 21 acres per AUM. The allotment is currently under a rotation grazing system.

The following BLM range improvements have been authorized within Sections affected by the entire Project Area: one well; one fence; one fence/cattleguard; one pipeline/trough; one pipeline; two seeding projects; one seeding tank; two spring developments; and one reservoir dam.



EXPLANATION

- Project Boundary
- 10-Foot Drawdown Contour Maximum Extent
- Unpaved Road
- Phreatophytes

Impacted Water Rights

- Spring
- Underground (Well)

Range Allotments

- Lucky C Allotment
- Roberts Mountain Allotment
- Romano Allotment
- Ruby Hill Allotment
- Santa Fe/Ferguson Allotment
- Shannon Station Allotment
- 3 Bars Allotment

N

NATIONAL SYSTEM OF PUBLIC LANDS
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

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0 1 2 3 4 5 6 7 Miles

IF THE ABOVE BAR DOES NOT SCALE 1 INCH, THE DRAWING SCALE IS ALTERED

BATTLE MOUNTAIN DISTRICT OFFICE
Mount Lewis Field Office
50 Bastian Road
Battle Mountain, Nevada 89820

DESIGN:	DRAWN:	REVIEWED:
EMLLC	CVD/GSL	RFD
CHECKED:	APPROVED:	DATE:
-	RFD	07/31/2012

FILE NAME: p1635_Fig3-12-1_RangeAllotments.mxd

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Range Allotments

Figure 3.12.1

The consequences of weather and climate change on livestock grazing, and grassland use can be subtle and complex. The projected changes in climate – increases in temperature, reductions in soil moisture, and more intense rainfall events – may require changes in livestock management. The availability of feed and water for livestock grazing is extremely vulnerable to drought; hence the carrying capacity of land may influence livestock management.

3.12.3 Environmental Consequences and Mitigation Measures

3.12.3.1 Significance Criteria

Impacts to livestock grazing and production would be considered significant if the Proposed Action or alternatives would result in any of the following:

- Change in forage availability that measurably affects livestock grazing;
- Change in access to water that measurably affects livestock grazing;
- Change in number of AUMs available before, during, and after mining; or
- Undue harassment that adversely affects livestock grazing.

3.12.3.2 Assessment Methodology

Environmental consequences to livestock grazing and production within the Project Area were evaluated using authorized AUMs, pasture/use area acres, and Project disturbance acres. The pasture/use area acres were divided by the total AUMs by pasture (acres/AUM). The Project disturbance within each pasture was then divided by the acres/AUM to determine the total AUMs impacted. Where an allotment did not have pastures or use areas, the total acres and authorized AUMs were utilized for the calculation. **The analysis of effects to livestock grazing and production from the ground water drawdown, utilizes the acreage of phreatophytes within allotments affected by the ten-foot drawdown contour.**

3.12.3.3 Proposed Action

Project-related activities could result in direct impacts to livestock from traffic accidents or other mine-related activities. In order to minimize these impacts, a perimeter fence would be constructed during Project activities that would enclose 14,204 acres in the Mine and Process Area, which includes the open pit, WRDFs, and TSFs. The constructed fence would exclude livestock grazing during mine operations and reclamation for approximately 70 years. The open pit would result in the permanent loss of approximately 734 acres (644 acres within the Romano Allotment and 90 acres within the Roberts Mountain Allotment). **A total of 32 AUMs in the Romano and Roberts Mountain Allotments would be lost in perpetuity as a result of the open pit.** As described in the Proposed Action, the fence would be monitored on a regular basis and repairs made as needed.

When an area **of BLM administered land is devoted to** a single **public purpose**, such as mineral production, AUMs are adjusted to reflect the area withdrawn from multiple use. These AUMs are lost until such time mining has ceased and reclamation has been successfully completed. At that time, the area will be evaluated to determine if the AUMs can be returned.

In addition to the AUMs permanently lost as a result of the open pit, a total of 490 AUMs in the Roberts Mountain Allotment would be lost **for approximately 70 years** as a result of

7,954 acres being excluded by the Project fence. This would reduce the active grazing preference to 9,134 AUMs in the allotment from 9,624 AUMs (Table 3.12-2). The loss of AUMs represents five percent of the active grazing preference in the Roberts Mountain Allotment.

In addition to the AUMs permanently lost as a result of the open pit, a total of 291 AUMs in the Romano Allotment would be lost **for approximately 70 years** as a result of 6,252 acres being excluded by the Project fence. This would reduce the active grazing preference to 2,596 AUMs in the allotment from 2,887 AUMs (Table 3.12-2). The loss of AUMs represents ten percent of the active grazing preference in the Romano Allotment.

Table 3.12-2: Grazing Capacity within the Project Area and Area Affected by Ten-Foot Water Drawdown Contour Before and During Project Activities

Allotment	Active Grazing Capacity (AUMs)	
	Before the Proposed Action	During the Proposed Action
Lucky C	3,054	3,054
Roberts Mountain	9,624	9,134
Romano	2,887	2,596
Ruby Hill	1,286	1,286
Shannon Station	2,520	2,520
3 Bars	5,840	5,840
Santa Fe/Ferguson	3,994	3,994
Total	29,205	28,424

The grazing and agricultural service sectors of the Eureka County economy would be marginally affected by the reduction in AUMs associated with the Proposed Action due to the construction of the fence around 14,204 acres of the Project Area. The fence would exclude access to portions of the Roberts Mountains and Romano Allotments and result in **a** reduction of 781 AUMs for approximately 70 years **and 32 AUMs permanently from the development of the open pit**. According to the Nevada Grazing Statistics Report and Economic Analysis for Federal Lands in Nevada (Resource Concepts, Inc. 2001), the **total** economic **impact** associated with **each** AUM **equals** $53.40 (1999 dollars) **($73.75 in 2012 dollars) annually**. **This value specifically estimates** the direct, indirect, and induced impacts **of industry output and added value of grazing in Nevada. Applying this value to the AUMs permanently and temporarily displaced under the Proposed Action, the total economic impact could be an annual reduction of** $41,705 (1999 dollars) **($57,597 in 2012 dollars). This would be a $15,539 (1999 dollars) ($21,460 2012 dollars) impact resulting from displaced Romano Allotment AUMs and a $26,166 (1999 dollars) ($36,137 2012 dollars) impact resulting from displaced Roberts Mountain Allotment AUMs. While the impact may not be significant to the ranching community, the impact may be meaningful to individual ranch operations**. **However, it is important to note that this impact reflects the total economic impact, not lost revenue for specific operators. The subsequent two paragraphs describe in greater detail the economic impact to grazing investigated in the Nevada Grazing Statistics Report and Economic Analysis for Federal Lands in Nevada Report.**

The direct industry impacts to Nevada's economy from one AUM are estimated to be $24.40 based on the total production value of grazing divided by the total AUMs. Indirect and induced impacts to the industry, estimated at $16.00 per AUM, occur throughout the economy as a result

of providing goods and services to the livestock industry and include other industrial sectors such as crops, construction, manufacturing, transportation, communication, utilities, and trade and services. Induced impacts include those caused by household consumption as a result of the direct and indirect impacts. In total, industry impacts were estimated to equal $40.40 per AUM (1999 dollars).

The labor income impact estimates (total $7.40 per AUM) are based on the wages and salaries of workers and proprietors' income. Total value-added impacts ($13.00 per AUM) include impacts to wages and salaries, proprietors' income, other property income (i.e., interest, rent, royalties), and indirect business taxes (1999 dollars). Employment impacts based on $24.40 direct industry impacts are too small to have any impact based on one AUM.

Based on the estimated direct, indirect, and induced economic impacts of one AUM ($5**3**.40), the economic value of the 781 AUMs reduced during the life of the Project equates to $41,705.40 per year, or in sum $2,919,378.00 over approximately 70 years. This represents approximately 2.7 percent of the economic value of all the allotments affected by the Project. The permanent loss of 32 AUMs (valued at $1,708.80 annually **in 1999 dollars**) represents less than one percent of all allotments affected by the Project and, therefore, is considered a minor impact on the long-term Eureka County grazing economy.

Table 3.12-2 includes the active preference before and during the Project for the affected allotments. The loss of 781 AUMs represents 2.7 percent of the active grazing preference for the allotments in the Project Area.

- **Impact 3.12.3.3-1: Project development and operation under the Proposed Action would result in the permanent loss of 32 AUMs and the loss of 781 AUMs for approximately 70 years from allotments within the fenced Project Area.**

  Significance of the Impact: The impact is considered potentially significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures. Also see Section 3.26 for suggested mitigation outside of the BLM's jurisdiction.

The 14,204-acre enclosure would not impact AUMs within the 3 Bars, Santa Fe/Ferguson, or Lucky C Allotments**; h**owever, portions of these allotments could **sustain** potential impacts to AUMs due to the possible impacts to forage in the phreatophyte vegetation community related to ground water drawdown. **Figure 3.12.1 illustrates the location of phreatophytes relative to the allotments within the Project Area boundary and the ten-foot drawdown contour. There are no phreatophytes on private land within the ten-foot drawdown.**

Ground water drawdown could result in a change from phreatophytes to another vegetation community composed of plant species that do not have long roots that reach down to the water table that would still provide forage for livestock. **Impacts are not expected to other vegetation communities that do not rely on the direct connection to ground water.** Additionally, reseeding mitigation proposed in Section 3.11.3 would ensure the availability of forage for livestock in areas identified by the BLM. **Following reseeding, the BLM would evaluate and determine if there is a need to suspend livestock grazing for two years or until the objectives of the seeding are met. The BLM would utilize rangeland standards as a goal**

following reseeding and revegetation. Impacts to other vegetation communities as a result of drawdown are not expected. Therefore, impacts to overall AUM availability within the allotments as a result of the drawdown are not expected.

- **Impact 3.12.3.3-2: Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Although the lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities, it is possible that the changes in phreatophyte community would result in a loss of forage productivity. Impacts to other vegetation communities as a result of drawdown are not expected.**

  Significance of the Impact: The impact is considered potentially significant. The following mitigation has been identified for this impact.

- **Mitigation Measure 3.12.3.3-2: The BLM would monitor for changes to forage productivity as a result of ground water drawdown associated with Project-related ground water pumping. If the BLM detects a loss of forage productivity attributed to the Project, the BLM would develop and provide EML with a list of appropriate seed mixes for those areas within and outside the Project Area impacted by water table drawdown that should be seeded. The nature of the seed mix may vary depending on the conditions encountered as a result of the drawdown. If the BLM determines reseeding to be necessary, the BLM would coordinate the conditions for reseeding (including a possible two-year grazing closure) with local permittees in order to reduce impacts to AUMs. Mitigation for the potential loss of water available for livestock from stock water rights and other surface waters are described in the Water Resources - Water Quantity impacts discussion (Mitigation Measures 3.2.3.3-2 and 3.2.3.3-3). Mitigation for loss of water available would also mitigate the loss of vegetation (livestock forage).**

- **Effectiveness of Mitigation and Residual Effects: Mitigation measure 3.12.3.3-2 would reduce potential impacts to local permittees from changes in vegetation species composition and percent cover as a result of water table drawdown during Project activities. Monitoring vegetation and possible reseeding with an appropriate seed mix, as well as BLM coordination with local permittees following reseeding, would reduce the long-term impacts to AUMs, although short-term impacts may occur while any reseeding effort is implemented. If a two-year suspension is required, impacts would persist until the suspension is lifted, in an amount proportionate to the amount of AUMs temporarily suspended.**

Mine dewatering**,** ground water pumping**, and** subsequent recovery of the water table is expected to draw down the ground water table in an area surrounding the open pit. As discussed in Section 3.2, modeling results show that significant water table drawdown in the aquifer would occur in an area measuring approximately 232 square miles around the Project Area, including the northeast quadrant of Kobeh Valley and the southernmost fringe of Roberts Mountains. Stock water resources within the ten-foot drawdown contour from Proposed Action pumping include water rights within the Romano, Lucky C, Roberts Mountain, 3 Bars, and Santa Fe/Ferguson Allotments. Eighteen existing stock water rights occurring within the ten-foot drawdown area

may experience negative impacts including a reduction in available water or complete water loss as a result of ground water drawdown associated with the Proposed Action (Figure 3.12.1). Table 3.2-7 in the Water Resources - Water Quantity Section identifies the water rights associated with stock water that would be located within the ten-foot drawdown contour from the Proposed Action activities. Twenty-two springs and two segments of perennial streams are also located within the area predicted to be impacted by the ground water drawdown. Livestock that utilize those sources of water could be affected. Springs predicted to be impacted are shown on Figure 3.2.9.

Livestock require water year long to satisfy physiological requirements. The reduction or loss of existing water sources could impact livestock in the Project Area. A reduction in surface water **c**ould **also** affect the amount of foraging habitat for livestock**, as discussed previously**.

- **Impact 3.12.3.3-3:** Livestock dependent on existing water sources in the Project Area would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table could result in reduced water available for use in rangeland management.

  Significance of the Impact: The impact could be potentially significant**. The following** mitigation **has been identified for this impact**.

- **Mitigation Measure 3.12.3.3-3:** Mitigation for the potential loss of water availab**ility** for livestock from stock water rights and other surface waters are described in the Water Resources - Water Quantity impacts discussion (Mitigation Measures 3.2.3.3-2 and 3.2.3.3-3). **Implementation of any of the specific mitigation outlined in these measures for springs located on private land would be subject to the authorization of the private land owner. Mitigation for loss of water available would also mitigate the loss of vegetation (livestock forage). Additionally, where livestock and wild horse use overlap those mitigation measures identified for wild horses (Mitigation Measure 3.13.3.3-1) would also benefit livestock.**

- **Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measures in Section 3.2.3 would effectively mitigate any reductions in water available for use in rangeland management (i.e., this includes livestock grazing)**, with the exception of impacts to forage on private land associated with riparian areas**. **The BLM cannot require a private land owner to consent to the implementation of mitigation on their private land; therefore, there is a potential loss of forage associated with the riparian areas on private land.** Ongoing monitoring included in the mitigation measures would ensure that adequate water supplies are maintained and available for livestock.

No impacts to existing range improvements other than developed spring sites **and removal of existing fencing within the Project fence** are anticipated.

The evaluation of the potential effects of the pit lake on livestock used a screening level ecological risk assessment (SLERA). The general approach used in the preparation of the SLERA is similar to that developed by the Environmental Sciences Division and Life Sciences Division of Oak Ridge National Laboratory for the U.S. Department of Energy. In addition, the SLERA incorporated more recent toxicity reference values (TRVs) for certain inorganic

chemical constituents derived by the EPA (SRK 2009). Together, these were used to develop species-specific toxicity criteria to which the predicted constituents in the pit water were compared.

Protective criteria for the surrogate species are likely to be protective of local species occupying similar ecological niches at the Project Area. Additionally, it was assumed that the livestock receptors would consume water from the pit lake; and, that this water would constitute 100 percent of each species individual daily water requirements (i.e., no outside sources of water would be utilized over the life of the animal). This is considered an extremely conservative assumption.

The results of the assessment indicate that the most likely predicted water quality of the modeled future pit lake water at the Project Area could represent a low to moderate toxicological threat to livestock based on Nevada's beneficial use standard for livestock watering. However, since this water is not intended to be a livestock watering source **and livestock access would be restricted by the construction of the pit perimeter berm**, and the standards were based on limited toxicological information, the probable risk to livestock from the pit lake created under the Proposed Action would be low.

The majority of disturbed lands within the 14,204-acre enclosure would be reclaimed and available for future grazing. Successful revegetation of disturbed lands would increase plant cover and provide an adequate amount of forage to recover the majority of AUMs lost during the Project. Once vegetation has been successfully re-established (BLM/NDEP standards), the BLM would **re-**evaluate livestock **grazing** in the Project Area.

3.12.3.3.1 Residual Adverse Impacts

The Proposed Action would result in the unavoidable permanent loss of **32 AUMs from the development of the open pit and the loss of 781 AUMs for approximately 70 years from allotments within the fenced Project Area**.

3.12.3.4 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and associated impacts to livestock grazing and production would not occur. EML would continue existing activities under previously permitted Notices, and the area would remain available for future mineral development or for other purposes as approved by the BLM.

3.12.3.4.1 Residual Adverse Impacts

There would be no residual adverse impacts to livestock grazing and production under the No Action Alternative.

3.12.3.5 Partial Backfill Alternative

Impacts to livestock grazing and production would be similar to those described for the Proposed Action; however, the Partial Backfill Alternative would involve the partial backfilling of the open pit to eliminate the pit lake, and the floor of the backfilled open pit (approximately 527 acres) would be reclaimed with growth media and seeded. **Because the pit lake would be**

eliminated, there would be no potential for adverse impacts due to livestock drinking water from the pit lake. Livestock, however, would continue to be excluded from the open pit area, and impacts under this alternative would **otherwise** be similar to those described for the Proposed Action.

- **Impact 3.12.3.5-1:** Project development and operation under the Partial Backfill Alternative would result in the **permanent loss of 32 AUMs and the** loss of 781 AUMs **for approximately 70 years** from allotments within the fenced Project Area.

  Significance of the Impact: The impact is considered potentially significant**.**

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures. Also see Section 3.26 for suggested mitigation outside of the BLM's jurisdiction.

Impacts to forage productivity as a result of the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table under the Partial Backfill Alternative would be similar to those impacts described for the Proposed Action.

- **Impact 3.12.3.5-2: Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Although the lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities, it is possible that the changes in phreatophyte community would result in a loss of forage productivity. Impacts to other vegetation communities as a result of drawdown are not expected.**

  Significance of the Impact: The impact is considered potentially significant. The following mitigation has been identified for this impact.

- **Mitigation Measure 3.12.3.5-2: The BLM would monitor for changes to forage productivity as a result of ground water drawdown associated with Project-related ground water pumping. If the BLM detects a loss of forage productivity attributed to the Project, the BLM would develop and provide EML with a list of appropriate seed mixes for those areas within and outside the Project Area impacted by water table drawdown that should be seeded. The nature of the seed mix may vary depending on the conditions encountered as a result of the drawdown. If the BLM determines reseeding to be necessary, the BLM would coordinate the conditions for reseeding (including a possible two-year grazing closure) with local permittees in order to reduce impacts to AUMs. Mitigation for the potential loss of water available for livestock from stock water rights and other surface waters are described in the Water Resources - Water Quantity impacts discussion (Mitigation Measures 3.2.3.3-2 and 3.2.3.3-3). Mitigation for loss of water available would also mitigate the loss of vegetation (livestock forage).**

- **Effectiveness of Mitigation and Residual Effects: Mitigation measure 3.12.3.5-2 would reduce potential impacts to local permittees from changes in vegetation**

species composition and percent cover as a result of water table drawdown during Project activities. Monitoring vegetation and possible reseeding with an appropriate seed mix, as well as BLM coordination with local permittees following reseeding, would reduce the long-term impacts to AUMs, although short-term impacts may occur while any reseeding effort is implemented. If a two year suspension is required, impacts would persist until the suspension is lifted, in an amount proportionate to the amount of AUMs temporarily suspended.

- **Impact 3.12.3.5-3:** Livestock dependent on existing water sources in the Project Area would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table could result in reduced water available for use in rangeland management.

Significance of the Impact: The impact could be potentially significant**. The following** mitigation **has been identified for this impact**.

- **Mitigation Measure 3.12.3.5-3:** Mitigation for the potential loss of water availab**ility** for livestock is described in the Water Resources - Water Quantity impacts discussion (Mitigation Measures 3.2.3.3-2 and 3.2.3.3-3). **Implementation of any of the specific mitigation outlined in these measures for springs located on private land would be subject to the authorization of the private land owner. Mitigation for loss of water available would also mitigate the loss of vegetation (livestock forage). Additionally, where livestock and wild horse use overlap those mitigation measures identified for wild horses (Mitigation Measure 3.13.3.3-1) would also benefit livestock.**

- **Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measures in Section 3.2.3 would effectively mitigate any reductions in water available for use in rangeland management**, with the exception of impacts to forage on private land associated with riparian areas. The BLM cannot require a private land owner to consent to the implementation of mitigation on their private land; therefore, there is a potential loss of forage associated with the riparian areas on private land**. Ongoing monitoring included in the mitigation measures would ensure that adequate water supplies are maintained and available for livestock.

3.12.3.5.1 Residual Adverse Impacts

Residual impacts for livestock grazing and production under the Partial Backfill Alternative would be the loss of **32 AUMs from the development of the open pit and the loss of 781 AUMs for approximately 70 years from allotments within the fenced Project Area**.

3.12.3.6 Off-Site Transfer of Ore Concentrate for Processing Alternative

Although the Off-Site Transfer of Ore Concentrate for Processing Alternative would result in approximately 20 acres less surface disturbance compared to the Proposed Action, impacts to livestock grazing and production from this alternative would be similar to those for the Proposed Action since the acreage would decrease by only 0.2 percent.

- **Impact 3.12.3.6-1:** Project development and operation under the Off-Site Transfer of Ore Concentrate for Processing Alternative would result in the **permanent loss of 32 AUMs**

and the loss of 781 AUMs **for approximately 70 years from allotments within the fenced Project Area**.

Significance of the Impact: The impact is considered potentially significant**.**

No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures. Also see Section 3.26 for suggested mitigation outside of the BLM's jurisdiction.

Impacts to forage productivity as a result of the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table under the Off-Site Transfer of Ore Concentrate for Processing Alternative would be similar to those impacts described for the Proposed Action.

- **Impact 3.12.3.6-2: Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Although the lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities, it is possible that the changes in phreatophyte community would result in a loss of forage productivity. Impacts to other vegetation communities as a result of drawdown are not expected.**

  Significance of the Impact: The impact is considered potentially significant. The following mitigation has been identified for this impact.

- **Mitigation Measure 3.12.3.6-2: The BLM would monitor for changes to forage productivity as a result of ground water drawdown associated with Project-related ground water pumping. If the BLM detects a loss of forage productivity attributed to the Project, the BLM would develop and provide EML with a list of appropriate seed mixes for those areas within and outside the Project Area impacted by water table drawdown that should be seeded. The nature of the seed mix may vary depending on the conditions encountered as a result of the drawdown. If the BLM determines reseeding to be necessary, the BLM would coordinate the conditions for reseeding (including a possible two-year grazing closure) with local permittees in order to reduce impacts to AUMs. Mitigation for the potential loss of water available for livestock from stock water rights and other surface waters are described in the Water Resources - Water Quantity impacts discussion (Mitigation Measures 3.2.3.3-2 and 3.2.3.3-3). Mitigation for loss of water available would also mitigate the loss of vegetation (livestock forage).**

- **Effectiveness of Mitigation and Residual Effects: Mitigation measure 3.12.3.6-2 would reduce potential impacts to local permittees from changes in vegetation species composition and percent cover as a result of water table drawdown during Project activities. Monitoring vegetation and possible reseeding with an appropriate seed mix, as well as BLM coordination with local permittees following reseeding, would reduce the long-term impacts to AUMs, although short-term impacts may occur while any reseeding effort is implemented. If a two year suspension is**

required, impacts would persist until the suspension is lifted, in an amount proportionate to the amount of AUMs temporarily suspended.

- **Impact 3.12.3.6-3:** Livestock dependent on existing water sources in the Project Area would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table could result in reduced water available for use in rangeland management.

  Significance of the Impact: The impact could be potentially significant**. The following** mitigation **has been identified for this impact**.

- **Mitigation Measure 3.12.3.6-3:** Mitigation for the potential loss of water availab**ility** for livestock is described in the Water Resources - Water Quantity impacts discussion (Mitigation Measures 3.2.3.3-2 and 3.2.3.3-3). **Implementation of any of the specific mitigation outlined in these measures for springs located on private land would be subject to the authorization of the private land owner. Mitigation for loss of water available would also mitigate the loss of vegetation (livestock forage). Additionally, where livestock and wild horse use overlap those mitigation measures identified for wild horses (Mitigation Measure 3.13.3.3-1) would also benefit livestock.**

- **Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measures in Section 3.2.3 would effectively mitigate any reductions in water available for use in rangeland management**, with the exception of impacts to forage on private land associated with riparian areas. The BLM cannot require a private land owner to consent to the implementation of mitigation on their private land; therefore, there is a potential loss of forage associated with the riparian areas on private land**. Ongoing monitoring included in the mitigation measures would ensure that adequate water supplies are maintained and available for livestock.

3.12.3.6.1 Residual Adverse Impacts

The Off-Site Transfer of Ore Concentrate for Processing Alternative would result in the unavoidable permanent loss of **32 AUMs from the development of the open pit and the loss of 781 AUMs for approximately 70 years from allotments within the fenced Project Area.**

3.12.3.7 Slower, Longer Project Alternative

Impacts under the Slower, Longer Project Alternative would be of the same type as the impacts under the Proposed Action, but would last for approximately 115 years.

The number of AUMs lost would be the same as the Proposed Action. However, the potential for resumption of livestock grazing within the fenced Project Area would be prolonged (115 years compared to 70 years). **Based on the longer Project duration, the economic impact to livestock grazing as a result of this alternative would be approximately $1,876,743 more than the impact under the Proposed Action.**

The 14,204-acre exclosure would not impact AUMs within the 3 Bars, Santa Fe/Ferguson, or Lucky C Allotments but could potentially impact AUMs due to possible impacts to forage and habitat related to water level drawdown.

- **Impact 3.12.3.7-1:** Project development and operation under the Slower, Longer Project Alternative would result in **permanent loss of 32 AUMs and** the loss of 781 AUMs **for approximately 115 years** from allotments within the Project Area.

  Significance of the Impact: The impact is considered potentially significant**.**

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures. Also see Section 3.26 for suggested mitigation outside of the BLM's jurisdiction.

Impacts to forage productivity as a result of the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table under the Slower, Longer Project Alternative would be similar to those impacts described for the Proposed Action, but of a longer duration.

- **Impact 3.12.3.7-2: Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Although the lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities, it is possible that the changes in phreatophyte community would result in a loss of forage productivity. Impacts to other vegetation communities as a result of drawdown are not expected.**

  Significance of the Impact: The impact is considered potentially significant. The following mitigation has been identified for this impact.

- **Mitigation Measure 3.12.3.7-2: The BLM would monitor for changes to forage productivity as a result of ground water drawdown associated with Project-related ground water pumping. If the BLM detects a loss of forage productivity attributed to the Project, the BLM would develop and provide EML with a list of appropriate seed mixes for those areas within and outside the Project Area impacted by water table drawdown that should be seeded. The nature of the seed mix may vary depending on the conditions encountered as a result of the drawdown. If the BLM determines reseeding to be necessary, the BLM would coordinate the conditions for reseeding (including a possible two-year grazing closure) with local permittees in order to reduce impacts to AUMs. Mitigation for the potential loss of water available for livestock from stock water rights and other surface waters are described in the Water Resources - Water Quantity impacts discussion (Mitigation Measures 3.2.3.3-2 and 3.2.3.3-3). Mitigation for loss of water available would also mitigate the loss of vegetation (livestock forage).**

- **Effectiveness of Mitigation and Residual Effects: Mitigation measure 3.12.3.7-2 would reduce potential impacts to local permittees from changes in vegetation species composition and percent cover as a result of water table drawdown during Project activities. Monitoring vegetation and possible reseeding with an appropriate seed mix, as well as BLM coordination with local permittees following reseeding, would reduce the long-term impacts to AUMs, although short-term impacts may occur while any reseeding effort is implemented. If a two year suspension is**

required, impacts would persist until the suspension is lifted, in an amount proportionate to the amount of AUMs temporarily suspended.

The majority of disturbed lands within the 14,204-acre exclosure would be reclaimed and available for future grazing. Successful revegetation of disturbed lands would increase plant cover and provide an adequate amount of forage to recover the majority of AUMs lost during the Project. Once vegetation has been successfully re-established (BLM/NDEP standards), the BLM would evaluate livestock resumption within the Project Area.

The open pit would result in the permanent loss of approximately 734 acres (644 within the Romano Allotment and 90 acres within the Roberts Mountain Allotment).

As discussed in the Proposed Action, 18 existing stock water rights occurring within the ten-foot drawdown area may experience negative impacts including a reduction in available water or complete water loss as a result of ground water drawdown associated with the Slower, Longer Project Alternative. Livestock require water year long to satisfy physiological requirements. The reduction or loss of existing water sources could impact livestock in the Project Area. A reduction in surface water would affect the amount of foraging habitat for livestock.

- **Impact 3.12.3.7-3:** Livestock dependent on existing water sources in the Project Area would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table could result in reduced water available for use in rangeland management.

  Significance of the Impact: The impact could be potentially significant**. The following** mitigation **has been identified for this impact**.

- **Mitigation Measure 3.12.3.7-3:** Mitigation for the potential loss of water availab**ility** for livestock from stock water rights and other surface waters is described in the Water Resources - Water Quantity impacts discussion (Mitigation Measures 3.2.3.3-2 and 3.2.3.3-3). **Implementation of any of the specific mitigation outlined in these measures for springs located on private land would be subject to the authorization of the private land owner. Mitigation for loss of water available would also mitigate the loss of vegetation (livestock forage). Additionally, where livestock and wild horse use overlap those mitigation measures identified for wild horses (Mitigation Measure 3.13.3.3-1) would also benefit livestock.**

- **Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measures in Section 3.2.3 would effectively mitigate any reductions in water available for use in rangeland management**), with the exception of impacts to forage on private land associated with riparian areas. The BLM cannot require a private land owner to consent to the implementation of mitigation on their private land; therefore, there is a potential loss of forage associated with the riparian areas on private land**. Ongoing monitoring included in the mitigation measures would ensure that adequate water supplies are maintained and available for livestock.

No impacts to existing range improvements **other than developed spring sites and removal of existing fencing within the Project fence** are anticipated.

The probable risk to livestock from the pit lake created under the Slower, Longer Project Alternative is the same as for the Proposed Action and would be low.

3.12.3.7.1 Residual Adverse Impacts

The Slower, Longer Project Alternative would result in the unavoidable permanent loss of **32 AUMs from the development of the open pit**.

3.13 Wild Horses

3.13.1 Regulatory Framework

Under the FLPMA, wild horses and burros are one of the multiple uses that the BLM must manage in combination to best meet the public's present and future needs. The FLPMA included the approval for the use of helicopters for gathers and required that a current inventory of wild horses and burros be maintained. The Public Rangelands Improvement Act of 1978 defined excess horses, mandated research, and provided guidance for titles of adopted horses and the adoption process.

3.13.1.1 Wild Free-Roaming Horses and Burros Act

The Wild Free-Roaming Horses and Burros Act of 1971 (WFRHBA) (Public Law 92-195) protects wild free-roaming horses and burros from capture, branding, harassment, or death. This Act also defines the ecological and multiple-use role of the management of wild horses and burros on federal lands and their historical and cultural value. The Act applies to all unbranded and unclaimed horses and burros on public lands administered by the BLM (43 CFR 4700) (BLM 2000). In accordance with the WFRHBA, wild horses are to be managed so as to maintain a thriving natural ecological balance on the range, and protect the range from the deterioration associated with overpopulation.

Herd Management Areas (HMAs) are identified in Land Use Planning for long-term management of wild horses and are designated "Special Management Areas" on public lands. The BLM maintains and manages wild horses **and burros** in HMAs and in Nevada wild horses and burros are found in approximately 100 HMAs, totaling approximately 15,249,265 acres (BLM 2011**a**). Establishment of HMAs must take into consideration the Appropriate Management Level (AML) for the herd, the habitat requirements of the animals, and the relationships with other uses of public land. The objective of the management of wild horses and burros is to limit the animals' distribution to the Herd Areas (HAs), which are limited to areas of public lands identified as being habitat used by wild horses and burros at the time of the passage of the WFRHBA (43 CFR 47000-5(d)). A herd is defined as one or more stallions and his mares. Management strategies include monitoring, inventory, and removal of excess wild horses or burros through periodic gathers, with an emphasis to limit management activities to the minimal feasible level (BLM 2000).

Wild horse and burro herds increase at relatively high rates because they **have virtually no** natural predators (BLM 2000). The majority of wild horse foals are born between March 1 and July 1, annually. Throughout the HMAs, populations increase by ten to 22 percent annually. AMLs have been established by the BLM's MLFO. According to the WFRHBA, when population inventory, monitoring data, and other data indicate that an over population of wild

horses exists, a gather would be planned to remove excess wild horses and achieve the AML. Other population controls such as fertility control may also be implemented to slow population growth rates and maintain a thriving natural ecological balance on the range and protect the range from the deterioration associated with overpopulation. The BLM prepares the horses and burros for adoption through permanent adoption centers. The BLM is also guided by the Nevada Northeastern Great Basin Resource Advisory Council to promote healthy rangelands through implementation of standards and guidelines for maintaining healthy wild horse and burro herds on HMAs.

3.13.2 Affected Environment

3.13.2.1 Study Methods

This section includes a discussion of wild horse movement, gathers, and existing HMAs within the Project Area. The predicted ten-foot ground water drawdown would also impact the Fish Creek HMA and Kobeh Valley HA. The Roberts Mountain, Whistler Mountain, and Fish Creek HMAs and Kobeh Valley HA are managed jointly by the BLM as a Wild Horse Complex.

3.13.2.2 Existing Conditions

The Project is located within the Roberts Mountain and Whistler Mountain HMAs.

Roberts Mountain HMA

The Roberts Mountain HMA is located 30 miles northwest of Eureka, Nevada, in Eureka County west of SR 278. The HMA consists of 99,990 acres and is 17 miles long by ten miles wide. The HMA shares the eastern boundary with the Whistler Mountain HMA.

The AML for the Roberts Mountain HMA is 150 wild horses. **The 2012 post-foaling population is 273.** Many of the horses in the Roberts Mountain HMA are distributed into the lower elevations of Kobeh Valley during both summer and winter. Several water sources appear to be key in influencing movement patterns. Figures 3.2.2 and 3.2.3 identify known surface water sources available to wild horses within and adjacent to the HMA. Wild horses also move back and forth into the Whistler Mountain HMA and outside of HMA boundaries into the Kobeh Valley HA and the northern portion of the Fish Creek HMA.

Wild horses travel throughout the Roberts Mountain HMA with few impediments to the movement. There are several pasture fences and drift fences throughout the two allotments included within the HMA, but the horses know where the fences are located and travel through open gates and around drift fences. During summer months, horses may move into the higher elevations and foothills that support piñon-juniper and contain springs and ponds. A primary water source used by horses in summer is Mud Springs, a water filled depression that holds water until late summer. During winter months, wild horses often move down to the lower elevations in the southern portion of the HMA as snow accumulates in the mountains. During the winter months, wild horses from the Roberts Mountain HMA have been documented moving south out of the HMA into the northwest portion of Kobeh Valley and joining with wild horses from the Whistler Mountain and Fish Creek HMAs.

The wild horses within the Roberts Mountain HMA are known to be moderate to large in size with good to excellent confirmation. Colors include many buckskins, palominos, roans, and duns in addition to the typical colors of bay, brown, and black (Personal Communication, Shawna Richardson, BLM Wild Horse Specialist, March 20, 2007). Genetic variability of this herd is high and this is likely due to both the past large population size and mixing with other herds. Genetic similarity results suggest a herd with mixed ancestry that is primarily North American which is consistent with the appearance of the horses.

A total of approximately 1**2,114** acres of the Project is located within the Roberts Mountain HMA. **Approximately 19 percent of the Project Area (excluding the portion of the HMA that occurs within the fenced portion of the Project Area) is located within this HMA.**

Whistler Mountain HMA

The Whistler Mountain HMA is located ten miles northwest of Eureka, Nevada, in Eureka County. The eastern boundary of the Whistler Mountain HMA lies along SR 278. The Whistler Mountain HMA consists of 43,247 acres and is 16 miles long and seven miles wide. The Whistler Mountain HMA shares its western boundary with the Roberts Mountain HMA and wild horses frequently move between the two HMAs. Additionally, no fence exists on the western boundary of the Whistler Mountain HMA in Kobeh Valley, allowing wild horse movement into the valley.

The AML for the Whistler Mountain HMA has been set for 14 to 24 wild horses. **The 2012 population** The AML for the Whistler Mountain HMA was developed with consideration of the movement patterns of the wild horses to ensure that their year round needs are met, and that over-utilization of the vegetation does not occur. The AML was also set at a level to ensure that wild horses are successful in drought years when forage and water may be limited.

The wild horses using the Whistler Mountain HMA and the Kobeh Valley area are strongly associated with the Roberts Mountain HMA. Fencelines separate the Roberts Mountain, Romano, and Lucky C Allotments; however, wild horses have found places to cross the fence by taking advantage of open gates and travel back and forth between the areas. Throughout the year, wild horses move back and forth into the Roberts Mountain HMA, as a result of changes in water supply, presence of livestock, and changes in forage condition and climate. In summer months, it is likely that the wild horses from the Whistler Mountain HMA move west into the Roberts Mountain HMA to access water sources and cooler, higher elevations. Figures 3.2.2 and 3.2.3 identify known surface water sources available to wild horses within and adjacent to the HMA.

In recent years, many wild horses have been observed in the Mount Hope vicinity especially in the spring; however, there may be a number of year-round wild horse residents in certain years. As many as 80 wild horses were estimated to be using the Mount Hope area in the spring of 2001. As many as 76 wild horses were observed both inside and outside of the Whistler Mountain HMA in 1994. During a 1992 population inventory flight, 87 wild horses were observed in the Romano Allotment portion of the Whistler Mountain HMA. Numbers observed in population inventory flights since that time have been low, with the exception of 1998 when 44 wild horses were observed. The population levels and distribution of the horses are also influenced by the Roberts Mountain HMA, which was gathered in 1987, 1995, 2001, and 2008.

A total of approximately 8,**943** acres of the Project are located within the Whistler Mountain HMA. **Approximately 12 percent of the Project Area (excluding the portion of the HMA that occurs within the fenced portion of the Project Area) is located within this HMA.**

Fish Creek HMA

The Fish Creek HMA is located a few miles south of Eureka, Nevada, in the Antelope and Little Smoky Valleys and in the Antelope and Fish Creek Mountains. The area is approximately 252,739 acres in size and is 25 miles wide and 28 miles long. However, a small portion of the HMA exists north of U.S. Highway 50, which is separated by highway ROW fences. This portion of the HMA is only 19,300 acres and is managed with the Whistler Mountain and Roberts Mountain HMAs.

The AML for the Fish Creek HMA was established through the **Final Multiple Use Decision (**FMUD**)** issued by the MLFO September 27, 2004, following the analysis of monitoring data and completion of the Fish Creek Complex Evaluation and Rangeland Health Assessment and Environmental Assessment (EA) #NV062-EA04-69. The total AML for the HMA was established as a range of 107 to 180 wild horses year round.

The portion of the Fish Creek HMA north of U.S. Highway 50 is located within the Kobeh Valley HA and neither the HMA nor the HA are extensively utilized by wild horses. Little water exists within HMA boundaries, and as a result, wild horses do not remain inside the HMA but move throughout Kobeh Valley and drift into the Whistler and Roberts Mountain HMAs. Figures 3.2.2 and 3.2.3 identify known surface water sources available to wild horses within and adjacent to the HMA. Due to lack of available water, a group of wild horses had to be removed from Kobeh Valley in 2001, in an emergency gather. There are no fences dividing the Fish Creek HMA from the Whistler Mountain HMA in Lucky C Allotment (northern portion). The AML for the northern portion of the Fish Creek HMA was established at six to ten wild horses, to account for the incidental use of wild horses in the area, and the lack of perennial water.

A total of approximately **333** acres of the Project are located within the Fish Creek HMA. **Approximately 1.5 percent of the Project Area (excluding the portion of the HMA that occurs within the fenced portion of the Project Area) is located within this HMA.**

Gather History

Four gathers have been completed within the Roberts Mountain HMA in 1987, 1995, 2001, and 2008. One gather was conducted between August 11 and 13, 1987, in which 120 wild horses were removed from within and outside of the HMA boundaries. The entire HMA was not gathered at that time, and the wild horses in the remainder of the HMA were left undisturbed.
The Roberts Mountain HMA was gathered between October 10 and 18, 1995. During this gather, a total of 344 wild horses were captured, and 170 were shipped to the Palomino Valley Center, on Pyramid Lake Highway approximately 20 miles north of Sparks, Nevada.

A total of 580 wild horses were captured in a gather conducted between July 13 and 23, 2001. At the end of the gather, 131 mares, foals and studs were released back to the HMA. During the 2001 wild horse gather on the Roberts Mountain HMA, 28 wild horses were removed from the Lucky C Allotment/Whistler HMA due to the lack of sufficient water (i.e., drought emergency). At the time, it was also estimated that between 60 and 80 wild horses may have moved into

Roberts Mountain HMA from the adjacent Whistler Mountain HMA and were gathered as part of the operation.

The most recent gather was completed between January 17 and 23, 2008. A total of 373 wild horses were captured in total from the Roberts Mountain HMA and Whistler Mountain HMA, with 25 mares and studs returned to the range. Most horses observed were very thin or emaciated due to limited forage and water available due to drought, compounded by deep snow throughout Kobeh Valley; only the healthiest horses were returned to the range.

Prior to 2008, no formal gathers of wild horses had been conducted within the Whistler Mountain HMA by the BLM. The population size of wild horses within the Whistler Mountain HMA is a product of gathers in adjacent areas. In 2001, 28 drought stressed horses were removed from the Whistler Mountain HMA in conjunction with the Roberts Mountain gather. The Kobeh Valley area outside the Fish Creek HMA was also gathered in 1994 at which time 129 horses were captured and 27 horses over the age of ten were released due to the selective removal policy. Gathers of the Kobeh Valley outside the Fish Creek HMA were also completed in 2008. In 2008, 30 wild horses were gathered and removed from the area.

Eleven groups of wild horses totaling 43 adults and nine foals were located during a population inventory in September 2008 in the area proposed to be fenced during the Project. The total 2011 wild horse population of the Roberts Mountain Complex, which includes Roberts Mountain, Whistler Mountain, and North Fish Creek HMAs and the Kobeh Valley HA is estimated to be 307. Population estimates for these HMAs are based on the average annual rate of increase in the HMAs of 17.5 percent.

3.13.3 Environmental Consequences and Mitigation Measures

3.13.3.1 Significance Criteria

Impacts to wild horses and burros would be considered significant if the Proposed Action or alternatives resulted in any of the following:

- Loss of acres, available forage, or water that results in substantial negative effects to the long-term health (including genetic variability) of the wild horses within the Roberts Mountain Complex; or
- Enhancement of, or interference, with the normal distribution and movement patterns of wild horses and burros within an HMA.

3.13.3.2 Assessment Methodology

The environmental consequences to wild horses in the Project Area were evaluated using available Project information. Potential impacts to the HMAs and wild horses were analyzed based on the current wild horse estimates in each of the areas, as well as the number of acres potentially affected by the Proposed Action.

In this environmental consequences discussion the Fish Creek HMA is not considered because 1) there are very few, if any, wild horses in the northern part of the Fish Creek HMA, 2) the northern end of the HMA was cut off by the U.S. Highway 50 fence, 3) there is very little water

on the northern end of the HMA, and 4) there is no direct effect of the Proposed Action to this HMA.

3.13.3.3 Proposed Action

3.13.3.3.1 Loss of Habitat, Available Forage, or Water

Approximately 14,204 acres of wild horse habitat would be directly removed as a result of the fence. Within the fenced area, approximately 13,998 acres are designated as one of two HMAs (Roberts Mountain HMA and Whistler Mountain HMA). A total of approximately 12,**113.7** acres of the Project are located within the Roberts Mountain HMA, and approximately 7,836 acres would be excluded within this HMA as a result of the construction of the Project-boundary fence. A total of approximately 8,**943** acres of the Project are located within the Whistler Mountain HMA, and approximately 6,162 acres would be excluded within this HMA as a result of the construction of the Project-boundary fence.

Project-related surface disturbance could also result in limiting wild horse access to developed and natural water sources located in the Project Area, and direct impacts could occur as a result of vehicular collisions along access roads. Section 3.2.3.3.1 discusses the specific affects to surface water resources.

Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities. Additionally, reseeding mitigation proposed in Section 3.**12**.3 would **improve** the availability of forage for wild horses in areas identified by the BLM. Impacts to other vegetation communities as a result of drawdown are not expected. Therefore, impacts to overall wild horse forage as a result of the drawdown are not expected.

- **Impact 3.13.3.3-1:** Approximately 14,204 acres of wild horse habitat would be directly removed as a result of the fence**. Approximately 232** acres of wild horse habitat **in the Project Area** would be potentially affected over the 44-year mine life and subsequent reclamation outside of the fenced portion of the Project**, excluding approximately 124 acres associated with the powerline portion of the Project Area and 50 acres associated with exploration**. **The location of the 50 acres of surface disturbance associated with exploration cannot be determined at this time. The location of the 124 acres of surface disturbance associated with the powerline would occur with the powerline portion of the Project Area; however, the exact location of this disturbance has not been specified yet. The exact number of acres of surface disturbance for these two Project features within each HMA cannot be calculated at this time.** Impacts to wild horses would also include a loss of access to water within the fenced portion of the Project Area. Impacts to wild horses could last approximately 70 years.

  Significance of the Impact: The impact is considered significant for wild horse access to water.

- **Mitigation Measure 3.13.3.3-1:** Specific mitigation for surface water resources identified as being impacted by the Project is listed in Table 3.2-9. In order to further mitigate the loss of habitat and water sources to wild horses through the Project Area, EML would provide alternative water sources for wild horses. Six locations within the Whistler Mountain and Roberts Mountain HMAs have been identified in coordination with the BLM and would be developed as water sources for horses and could also be used by wildlife and livestock in areas historically used by wild horses (Figure 3.13.1). These sites consist of existing stock wells that are not currently functioning or do not have pumps or troughs and two new sources tapped from Project production wells. These sources would provide water where it has not been available previously or where availability has been limited. These sources would replace water sources located within the Project boundary fence that would no longer be available to wild horses. Distribution of wild horse use would also be improved. The Project's Mitigation Plan is included in this EIS as Appendix **D**.

  The development of these six sites is detailed in Appendix **D, Attachment 2**. Appendix **D, Attachment 2** includes a description of how each site would be developed. The sites would be owned and operated by EML. Operations would include periodic inspections and maintenance, turning water on and off, and winterizing water sources as determined through coordination with the BLM. Upon Project completion, improvements associated with the stock watering wells and spring would remain in place for the continued support of wild horses, wildlife, and livestock within the HMAs and grazing allotments. EML would implement the mitigation plan in Appendix **D, Attachment 2**. Should EML decide not to retain ownership of the associated water rights, agreements would be reached at that time between EML, and those associated with the current grazing privileges on the specific allotment(s), NDOW, and BLM to transfer ownership of these improvements to the appropriate parties.

  The selection of new or replacement troughs and tanks would be based on design to reduce evaporation in the summer and reduce freezing in the winter. All pipelines from wellheads to the Project fenceline under this mitigation would be buried below the ground to avoid limiting wild horse movement.

  If Project activities caused a water source to become unavailable to wild horses, the Authorized Officer could require a new well to be drilled or another water development to be constructed in the general area to provide adequate water for the wild horses. Should monitoring indicate that wild horses were being negatively impacted by the mining activities, the Mount Lewis Field Manager could require additional measures for the protection of wild horses such as seasonal restrictions during the peak foaling period. Mitigation could include annual, biennial, or quarterly helicopter population inventory flights of the area in addition to on the ground monitoring by BLM and Project personnel. However, the use of a helicopter below 500 feet would not occur between March 1 and June 30 in order to prevent disruption during foaling period, causing orphaned or abandoned foals.

  Fences constructed around the Project Area would use white-topped steel posts. Additional reflectors may be necessary if problems with horses impacting fences occur. Fences should be continuous with no breaks (no drift fences). Horses climb steep or rocky terrain and may go around the ends of fences.

Should horses be discovered within the fenced areas, Project personnel would contact the BLM immediately to assist with the removal of the horses. Wild horses could be fence-wise and difficult to push through gates or fence openings. This often results in horses attempting to jump fences and becoming cut by barbed wire. BLM staff have materials to assist in the removal of wild horses. Project personnel would not "haze" wild horses out of fenced areas.

EML would avoid the BLM's Key Management Areas for vegetation monitoring established near Mount Hope and in Kobeh Valley.

Additional mitigation for livestock grazing and production is summarized in Appendix **D**.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measure 3.13.3.3-1 would be effective to reduce any impacts to the loss of habitat or resources within the HMA to less than significant. The Mitigation Plan would also ensure the effectiveness of this mitigation measure (Appendix **D**).

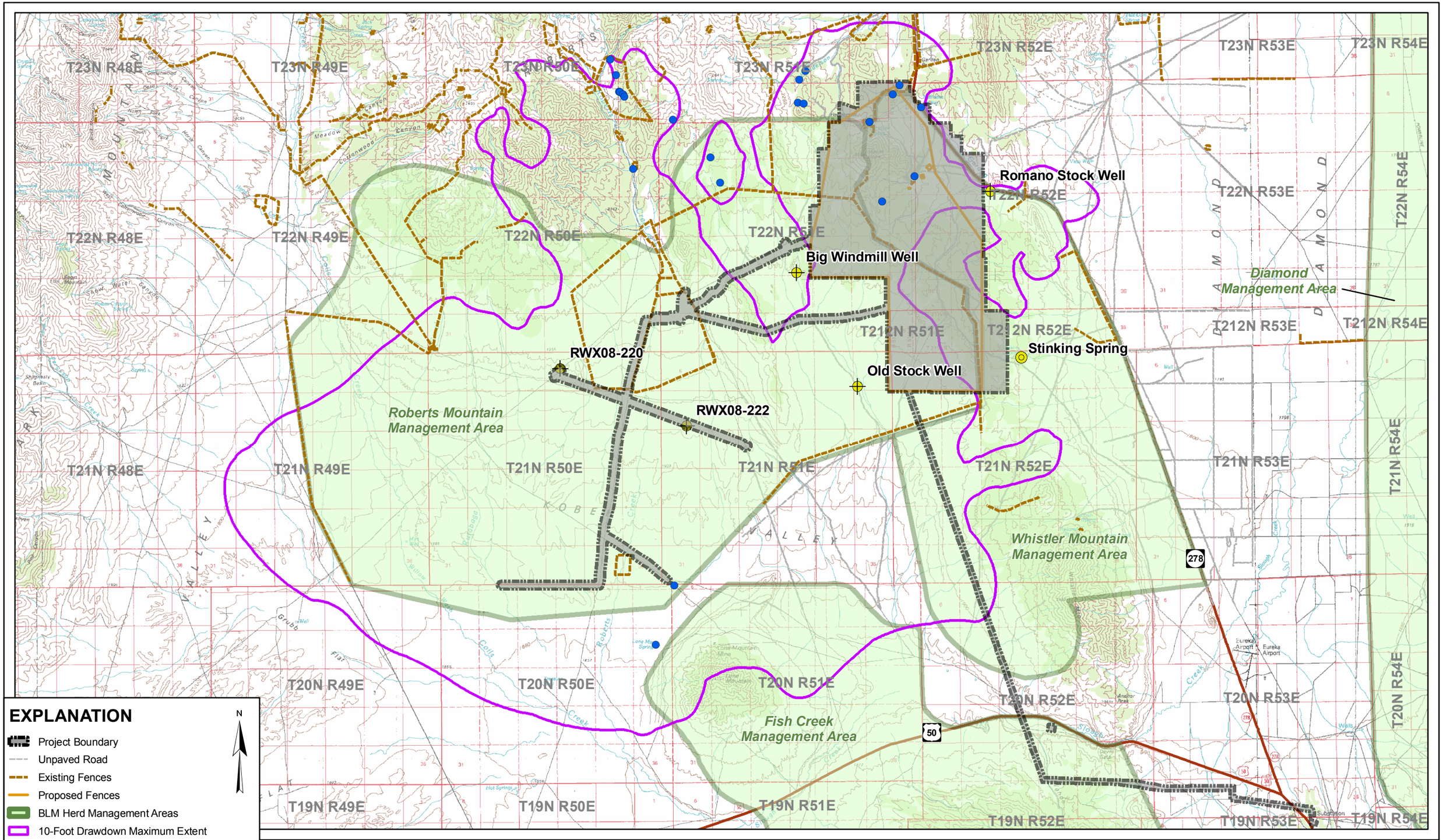
3.13.3.3.2 Impacts to the Normal Distribution and Movement Patterns of Wild Horses

Project-related activities could result in direct impacts to the movement patterns of wild horses. In order to minimize direct impacts to wild horses (i.e., wild horse-machinery collisions), a perimeter fence enclosing 14,204 acres would be constructed during Project activities in the general area, which includes the open pit, WRDFs, and TSFs. The construction of this fence would exclude wild horses during mine operation and reclamation for approximately 70 years. As described in the Proposed Action, the fence would be monitored on a regular basis and repairs made as needed. EML would assist, as requested, in moving these animals out of the Project Area. Construction of the fence would result in the movement of wild horses to other parts of the HMA potentially increasing the use of forage and water resources that may be already limited.

In addition, noise disturbance, human presence, and increased vehicular traffic would be continuous for approximately 44 years during implementation of the Proposed Action. Sudden loud noises such as blasts could cause wild horses to disperse in directions away from the sound. This behavior could send wild horses into unfamiliar terrain. Some wild horses may avoid the area while others may tolerate the noise and continue foraging and breeding activities in the vicinity of the Project Area.

Distribution changes could result in concentrations of wild horses using vegetation resources in certain areas and increased utilization levels. For example, increased human disturbance and unavailable land in the Whistler Mountain HMA and east portion of the Roberts Mountain HMA could result in the population shifting to the west portion of the Roberts Mountain HMA, resulting in larger numbers of wild horses using smaller land areas. As a result, upland forage species could be heavily utilized. Distribution changes could also result in reduced viewing opportunities by the public. Some impacts could occur to wild horses during the peak foaling season if widespread human activity disturbs the population. As a result, new foals could be orphaned or abandoned.

Potential impacts to the normal distribution and movement patterns of wild horses and burros are temporary in nature, and would not result in permanent displacement. Horses and some wildlife



EXPLANATION

- Project Boundary
- Unpaved Road
- Existing Fences
- Proposed Fences
- BLM Herd Management Areas
- 10-Foot Drawdown Maximum Extent

Potential Water Sources

- Well Water Source
- Spring or Seep Water Source
- Other Springs

N

0 1 2 3 4 5 6 7 Miles

IF THE ABOVE BAR DOES NOT SCALE 1 INCH, THE DRAWING SCALE IS ALTERED

BATTLE MOUNTAIN DISTRICT OFFICE
Mount Lewis Field Office
50 Bastian Road
Battle Mountain, Nevada 89820

DESIGN:	EMLLC	DRAWN:	CVD/GSL	REVIEWED:	RFD
CHECKED:	-	APPROVED:	RFD	DATE:	07/31/2012
FILE NAME:	p1635_Fig3-13-1_WildHorseManagement.mxd				

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Wild Horse Management Areas and Water Development Areas

Figure 3.13.1

species have shown the ability to adapt to the noise created by mines, road traffic, pumps, and even blasting.

- **Impact 3.13.3.3-2:** Project-related activities, such as the addition of a fence to the Project Area or noise from human presence, blasting, vehicular traffic, or other sources, associated with the Proposed Action could result in wild horse displacement and changes in wild horse use throughout the HMA for the 44-year Project life.

  Significance of the Impact: The mitigation outlined above and in Appendix **D, Attachment 2** would reduce the potential impacts to the distribution of wild horses. This impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.13.3.3.3 Residual Adverse Impacts

The Proposed Action would result in the unavoidable loss of 734 acres of wild horse foraging habitat resulting from surface disturbance in the open pit area. Approximately 14,204 acres of foraging habitat would be removed in the short term. The reclaimed land would have more grass and forb forage and less mature shrub forage in the short term.

The evaluation of the potential effects of the pit lake on wild horses used a SLERA. The general approach used in the preparation of the SLERA is similar to that developed by the Environmental Sciences Division and Life Sciences Division of Oak Ridge National Laboratory for the U.S. Department of Energy. In addition, the SLERA incorporated more recent TRVs for certain inorganic chemical constituents derived by the EPA (SRK 2009). Together, these were used to develop species-specific toxicity criteria to which the predicted constituents in the pit water were compared.

Protective criteria for the surrogate species are likely to be protective of local species occupying similar ecological niches at the Project Area. Additionally, it was assumed that the wildlife receptors would consume water from the pit lake; and, that this water would constitute 100 percent of each species individual daily water requirements (i.e., no outside sources of water would be utilized over the life of the animal). This is considered an extremely conservative assumption.

The results of the assessment indicate that the most likely predicted water quality of the modeled future pit lake water at the Project Area could represent a low to moderate toxicological threat to wild horses based on Nevada's beneficial use standard for livestock watering. However, since this water is not intended to be a livestock watering source **and livestock access would be restricted by the construction of the pit perimeter berm**, and the standards were based on limited toxicological information, the probable risk to wild horses from the pit lake under the Proposed Action would be low since wild horses could not access the pit lake.

3.13.3.4 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and associated impacts to wild horses would not occur. EML would continue existing activities under

previously authorized Notices, and the area would remain available for future mineral development or for other purposes as approved by the BLM.

3.13.3.4.1 Residual Adverse Impacts

There would be no residual adverse impacts to wild horses under the No Action Alternative.

3.13.3.5 Partial Backfill Alternative

Impacts to wild horses would be similar to those described for the Proposed Action, however, the Partial Backfill Alternative would involve the partial backfilling of the open pit to eliminate the pit lake and the floor of the open pit would be reclaimed with growth media and seeded. Although the Proposed Action would have 734 acres that would remain unvegetated in the open pit, under this alternative approximately 527 acres would remain unvegetated following Project completion and reclamation; therefore, impacts to wild horses would be similar to, but less than, those described for the Proposed Action.

- **Impact 3.13.3.5-1:** Approximately 14,204 acres of wild horse habitat would be directly removed as a result of the fence**. Approximately 232** acres of wild horse habitat **in the Project Area** would be potentially affected over the 44-year mine life and subsequent reclamation **outside of the fenced portion of the Project, excluding approximately 124 acres associated with the powerline portion of the Project Area and 50 acres associated with exploration. The location of the 50 acres of surface disturbance associated with exploration cannot be determined at this time. The location of the 124 acres of surface disturbance associated with the powerline would occur with the powerline portion of the Project Area; however, the exact location of this disturbance has not been specified yet. The exact number of acres of surface disturbance for these two Project features within each HMA cannot be calculated at this time**. Impacts to wild horses would also include a loss of access to water within the fenced portion of the Project Area.

  Significance of the Impact: The impact is considered significant for wild horse access to water.

- **Mitigation Measure 3.13.3.5-1:** Mitigation under the Partial Backfill Alternative would be the same as mitigation under the Proposed Action.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measure 3.13.3.5-1 would reduce any impacts to the loss of acreage or resources within the HMA to less than significant.

- **Impact 3.13.3.5-2:** Project-related activities, such as the addition of a fence to the Project Area or noise from blasting or other sources, associated with the Partial Backfill Alternative could result in wild horse displacement and changes in wild horse use throughout the HMA for the life of the Project.

  Significance of the Impact: The mitigation outlined above and in Appendix **D, Attachment 2** would reduce the potential impacts to the distribution of wild horses.

Impacts from the Partial Backfill Alternative would be the same as impacts from the Proposed Action.

No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.13.3.5.1 Residual Adverse Impacts

The Partial Backfill Alternative would result in the unavoidable loss of 527 acres of wild horse foraging habitat resulting from surface disturbance in the open pit area. Approximately 14,204 acres of foraging habitat would be removed in the short term. The reclaimed land would have more grass and forb forage and less mature shrub forage in the short term.

3.13.3.6 Off-Site Transfer of Ore Concentrate for Processing Alternative

Although the Off-Site Transfer of Ore Concentrate for Processing Alternative would result in approximately 20 acres less surface disturbance compared to the Proposed Action, impacts to wild horses from this alternative would be similar to those for the Proposed Action since the acreage would decrease by only 0.2 percent.

- **Impact 3.13.3.6-1:** Approximately 14,204 acres of wild horse habitat would be directly removed **as a result of the fence. Approximately 232** acres of wild horse habitat **in the Project Area** would be potentially affected over the 44-year mine life and subsequent reclamation **outside of the fenced portion of the Project, excluding approximately 124 acres associated with the powerline portion of the Project Area and 50 acres associated with exploration. The location of the 50 acres of surface disturbance associated with exploration cannot be determined at this time. The location of the 124 acres of surface disturbance associated with the powerline would occur with the powerline portion of the Project Area; however, the exact location of this disturbance has not been specified yet. The exact number of acres of surface disturbance for these two Project features within each HMA cannot be calculated at this time**. Impacts to wild horses would also include a loss of access to water within the fenced portion of the Project Area.

  Significance of the Impact: The impact is considered significant for wild horse access to water.

- **Mitigation Measure 3.13.3.6-1:** Mitigation under the Off-Site Transfer of Ore Concentrate for Processing Alternative would be the same as mitigation under the Proposed Action.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measure 3.13.3.6-1 would reduce any impacts to the loss of acreage or resources within the HMA to less than significant. The Mitigation Plan would also ensure the effectiveness of this mitigation measure (Appendix **D, Attachment 2**).

- **Impact 3.13.3.6-2:** Project-related activities, such as the addition of a fence to the Project Area or noise from human presence, blasting, vehicular traffic, or other sources,

associated with the Proposed Action could result in wild horse displacement and changes in wild horse use throughout the HMA for the life of the Project.

Significance of the Impact: Impacts from the Partial Backfill Alternative would be the same as impacts from the Proposed Action. The mitigation outlined above and in Appendix **D, Attachment 2** would reduce the potential impacts to the distribution of wild horses.

3.13.3.6.1 Residual Adverse Impacts

The Off-Site Transfer of Ore Concentrate for Processing Alternative would result in the unavoidable loss of 734 acres of wild horse foraging habitat resulting from surface disturbance in the open pit area. Approximately 14,204 acres of foraging habitat would be removed in the short term. The reclaimed land would have more grass and forb forage and less mature shrub forage in the short term. Impacts of the pit lake water toxicity to wild horses would be the same as the Proposed Action.

3.13.3.7 Slower, Longer Project Alternative

Impacts to wild horses from the Slower, Longer Project Alternative are expected to be similar to impacts from the Proposed Action at the end of the Project; however, impacts from the Slower, Longer Project Alternative would occur over a period approximately twice as long in duration compared to the Proposed Action.

- **Impact 3.13.3.7-1:** Approximately 14,204 acres of wild horse habitat would be directly removed as a result of the fence**. Approximately 232** acres of wild horse habitat **in the Project Area** would be potentially affected over the extended mine life and subsequent reclamation **outside of the fenced portion of the Project, excluding approximately 124 acres associated with the powerline portion of the Project Area and 50 acres associated with exploration. The location of the 50 acres of surface disturbance associated with exploration cannot be determined at this time. The location of the 124 acres of surface disturbance associated with the powerline would occur with the powerline portion of the Project Area; however, the exact location of this disturbance has not been specified yet. The exact number of acres of surface disturbance for these two Project features within each HMA cannot be calculated at this time. Impacts to wild horses would also include a loss of access to water within the fenced portion of the Project Area. Impacts to wild horses could last approximately twice as long as the Proposed Action**.

  Significance of the Impact: The impact is considered significant for wild horse access to water.

- **Mitigation Measure 3.13.3.7-1:** Specific mitigation for surface water resources that has been identified as being impacted by the Project is listed in Tables 3.2-9 and 3.2-18. Otherwise, the mitigation under the Slower, Longer Project Alternative would be the same as mitigation under the Proposed Action.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measure 3.13.3.7-1 would reduce any impacts to the loss of acreage or resources within

the HMA to less than significant. The Mitigation Plan would also ensure the effectiveness of this mitigation measure (Appendix **D, Attachment 2**).

- **Impact 3.13.3.7-2:** Project-related activities, such as the addition of a fence to the Project Area or noise from blasting or other sources, associated with the Slower, Longer Project Alternative could result in wild horse displacement and changes in wild horse use throughout the HMA for the duration of the Project, which would be twice as long as the Proposed Action.

  Significance of the Impact: Impacts from the Slower, Longer Project Alternative would be the same as impacts from the Proposed Action. The mitigation outlined above and in Appendix **D, Attachment 2** would reduce the potential impacts to the distribution of wild horses.

3.13.3.7.1 Residual Adverse Impacts

The Slower, Longer Project Alternative would result in the unavoidable loss of 734 acres of wild horse foraging habitat resulting from surface disturbance in the open pit area. Approximately 14,204 acres of foraging habitat would be removed during Project activities. The reclaimed land would have more grass and forb forage and less mature shrub forage.

3.14 Land Use

3.14.1 Regulatory Framework

The NEPA requires the consideration of local plans and policies in the assessment of the social and environmental effects of proposals involving federal lands. Federal, state, and local plans and guidelines that apply to land use authorizations and access within the study area include the following: Shoshone-Eureka RMP; 2010 Eureka County Master Plan, including the updated Natural Resources and Federal or State Land Use (Natural Resource and Land Use Plan) and Economic Development elements; and the Land and Resource Management Plan for the Toiyabe National Forest.

The Shoshone-Eureka RMP serves as the guiding policy document for BLM administered lands surrounding the Project Area. The ROD included the following objective relevant to the Proposed Action:

> Assure that mineral exploration, development and extraction are carried out in such a way as to minimize environmental and other resource damage and to provide, where legally possible, for the rehabilitation of lands.

The ROD also included the following Management Decision under Locatable Minerals:

> All public lands in the planning areas would be open for mining and prospecting unless withdrawn or restricted from mineral entry.

The Growth Management, Public Facilities and Services and Economic Development elements of the 2010 Eureka County Master Plan outline goals that pertain to the Project and include the following:

- Encourage new development in Eureka County in a planned and orderly manner consistent with maintenance of existing quality of life, environmental attributes, and fiscal resource limits of the County;
- Encourage new development to areas in or proximate to existing communities where public infrastructure can be efficiently provided and a sense of community can be established or improved;
- Provide for the organized planning, funding, construction, and maintenance of infrastructure at locations consistent with planned land uses and with capacities, which are adequate to meet the needs of these planner land uses**;**
- Retain and expand existing business and industry; and
- Diversify and expand the Eureka County economy.

The Natural Resources and Land Use Plan focuses on natural resource management on federal and state administered lands in Eureka County. Primary goals of this element are as follows:

> To maintain and improve the soil, vegetation and watershed resources in a manner that perpetuates and sustains a diversity of uses while fully supporting the custom, culture, economic stability and viability of Eureka County and its individual citizens.
>
> Facilitate environmentally responsible exploration, development and reclamation of oil, gas, geothermal, locatable minerals, aggregate and similar resources on federal lands.

Other elements in this Master Plan include policies related to the Project. Page 5-9 of the Economic Development Element contains the following policy related to the Project (County of Eureka 2000):

- Eureka County may identify and pursue mining industry induced industrial development opportunities; and
- Eureka County may encourage the productivity of existing "Building Blocks" beginning with such assets of as work force and natural resources including water, minerals, livestock forage, and wildlife.

The Natural Resource and Land Use Plan is an executable policy for natural resource management and land use on federal and state administered lands in Eureka County. The Plan's intention is to engage in decision making that pertains to any and all publically owned and managed lands and natural resources within its jurisdiction, as provided under law.

The Eureka County Master Plan, including the Natural Resource and Land Use Plan, were originally developed in response to Nevada SB 40, which directed the State Land Use Planning Agency to work with local planning entities to prepare local plans and policies regarding the use of federal lands in Nevada. Policies contained within the Master Plan include providing for economic stability, security and growth, social stability, private property rights, local and private management of resources, recreational opportunities, transportation and utility infrastructure, easements and ROWs, and public access to federal and state lands.

Public lands under BLM jurisdiction are managed "...on the basis of multiple use and sustained yield unless otherwise specified by law" (Sec. 102 (a)(7), FLPMA). Sec. 102 (a)(12) of FLPMA also states that, "the public lands be managed in a manner which recognizes the Nation's need for domestic sources of minerals, food, timber, and fiber from the public lands including

implementation of the MMPA (84 Stat. 1876, 30 U.S.C. 21a) as it pertains to the public lands**"**. The Project Area is contained within the BLM's BMD MLFO. The current operational land use plan for this region is the RMP (BLM 1986a). The plan covers 4.3 million acres of BLM-administered public lands in parts of Lander, Eureka, and Nye Counties.

BLM 43 CFR Subpart 3715 regulations address the unlawful use and occupancy of unpatented mining claims for non-mining purposes. The regulation limits such use and occupancy to that which is reasonably incident.

BLM 43 CFR 2800 regulations address the lawful use and occupancy of public lands through the BLM issuance of ROWs.

3.14.2 Affected Environment

3.14.2.1 Study Methods

The baseline data presented below is based on information from the Plan, Eureka County planning documents, and the MLFO files.

3.14.2.2 Existing Conditions

Approximately 79 percent of Eureka County lands are administered by the federal government. BLM manages the vast majority of the land in the county, while the USFS manages a small percentage of land in the southwestern corner of the county. BLM-administered public lands comprise approximately 74 percent, or 1,969,762 acres, of total federally owned lands in Eureka County (Eureka County 2000). Private lands comprise approximately 21 percent of the county. As described in the Master Plan, the single greatest surface land use within the county is open space agricultural, which is comprised of private farmland and ranches and a series of designated grazing allotments managed by the BLM. Mining represents the next largest land use with the bulk of mining activity concentrated in northeastern Eureka County.

Land uses within the Project Area consist primarily of livestock grazing and mineral exploration. The Project Area is located approximately 23 miles northwest of the Town of Eureka, which as of 20**10**, has a population of **610** people. The nearest residences to the Project are the Roberts Creek Ranch **to the west**, Alpha Ranch **to the north**, and residences in Diamond Valley **to the east and southeast**, which are approximately 6.5 miles, 14.5 miles north, and 9.3 miles **from the Project**, respectively. **The area in Diamond Valley with private land, which is where residences are located, is shown on Figure 3.14.1.** Livestock grazing on the Project Area and surrounding **allotments** in Eureka County is discussed in Section 3.12.

Historical mining occurred within the Project Area from the 1870s through the 1940s. Exxon Minerals Corporation conducted exploration activities in the late 1970s through the early 1980s. Currently, EML is conducting exploration operations within the Project Area. The closest mining operation to the Project Area is the Ruby Hill Mine, which is adjacent to the Town of Eureka, 23 miles southeast of the Project. Most of the other major mines are located approximately 40 miles or more from the Project.

Existing authorizations located within the Project Area are summarized in Table 3.14-1 and shown on Figure 3.14.1.

3.14.3 Environmental Consequences and Mitigation Measures

3.14.3.1 Significance Criteria

The Proposed Action would normally have a significant effect on land use if the following would occur:

- Result in the termination or substantial modification of a land use;
- Conflict with existing land use authorizations;
- Conflict with adopted land use plans and goals of the community where it is located; or
- Disrupt or divide the physical arrangement of an established community.

Table 3.14-1: BLM Rights-of-Way and Other Authorizations within the Project Area

Serial Number	Right-of-Way	Location		Total Width[1] (feet)
		Township, Range	Sections	
N-63162	Powerline	T20N, R52E	5, 8, 9, 16, 21, 27, 25-28	180
NEV-43007	Highway		19-22, 25, 26	400
NEV-04979	Highway		19-22, 25, 26	400
NEV-06317	Highway		19-22, 25, 26	400
N-56725	Road/Material Site		21, 22, 27, 28	60
N-10758	Telephone Line		20, 25-29, 35, 36	20
N-5253	Powerline		31-36	125
N-82778	Well		26	NA
N-82922	Oil and Gas Lease		4, 5	NA
N-82923	Oil and Gas Lease		6, 7	NA
N-82924	Oil and Gas Lease		8, 9	NA
N-82925	Oil and Gas Lease		15-18	NA
N-82926	Oil and Gas Lease		19-21	NA
CC-021890	Highway	T20N, R53E	4, 5, 8, 9, 16, 21, 27, 28, 34	400
N-5253	Powerline		31, 32, 33, 34, 35	125
N-5638	Powerline		1, 2, 4, 5, 9, 12-14, 18, 19, 21, 23, 26-31, 34, 35	50
N-5700	Power Substation/Powerline		35	NA
N-10758	Telephone Line		30,31	20
N-19754 03	Waste Water Ponds		35	NA
N-19823	Waste Water Delivery Line		35	50
N-31895	Telephone Line		29, 32	20
N-37190	Telephone Line		4, 5, 9, 16, 21, 27, 28, 33-35	VAR
N-48618	Pump/Pipeline		28, 33, 34	50
N-54498	Road		28, 32, 33	66
N-58497	Buried Fiber Optic Line		4, 5, 9, 16, 21, 27, 34	20
N-60801	Pipeline/Road		32	20
N-60802	Powerline		34, 35	25
N-61422	Road		19, 29, 31	33
N-62543	Gravel Pit		32	NA

Serial Number	Right-of-Way	Location		Total Width[1] (feet)
		Township, Range	Sections	
N-63162	Powerline		31-36	160
N-66394	Buried Fiber Optic Line		28-30, 33-36	15
N-74176	Powerline		28, 33	25
N-76179	Buried Fiber Optic Line		28-30, 33-36	15
N-79989	GPS Site		31	NA
N-82778	Well		31	NA
N-0 004979	Highway		28-30, 33-36	400
N-0 006317	Highway		28-30, 33-36	400
N-0 006320	Highway		33	400
N-0 006323	Highway		34	400
N-67106	Telephone Line		2, 14, 23, 26, 35	20
N-76760	Oil and Gas Lease		4, 5	NA
N-80158	Oil and Gas Lease		25, 26, 36	NA
N-83410	Oil and Gas Lease		8, 9, 16, 17	NA
N-83411	Oil and Gas Lease		20, 21, 27, 28	NA
N-83412	Oil and Gas Lease		29, 32-34	NA
N-5638	Powerline	T21N, R50E	2-5	25
N-40118	Well		3	NA
N-40119	Well		23	NA
N-47781	Powerline		2-5, 11, 12	25
N-52399	Road		3-6	66
N-79395	Oil and Gas Lease		5-8	NA
N-47781	Powerline	T21N, R51E	7, 8, 13-17	25
N-79359	Oil and Gas Lease		4-6	NA
N-79360	Oil and Gas Lease		8, 9, 16, 17	NA
N-79361	Oil and Gas Lease		20, 21, 28, 29	NA
N-79362	Oil and Gas Lease		31-33	NA
N-79400	Oil and Gas Lease		7, 18	NA
N-79401	Oil and Gas Lease		19, 30	NA
N-82902	Oil and Gas Lease		14, 16, 24, 26	NA
N-83372	Oil and Gas Lease		1, 2, 11, 12	NA
N-78979	Oil and Gas Lease	T21.N, R52E	2-6	NA
N-5638	Powerline	T22N, R49E	26, 27, 35, 36	25
N-47781	Powerline		26-28, 35, 36	25
N-52399	Road		26, 27, 35, 36	66
N-5638	Powerline	T22N, R50E	31, 32	25
N-47781	Powerline		31, 32	25
N-52399	Road		13, 24, 25, 31, 34-36	66
N-52540	Road		1, 2, 12, 13, 24	VAR
N-53667	Reservoir		13, 24	NA
N-63162	Powerline	T22N, R51E	2, 11, 13, 14, 24, 25, 36	160

Serial Number	Right-of-Way	Location		Total Width[1] (feet)
		Township, Range	Sections	
N-76363	Oil and Gas Lease		20, 21, 28, 29	NA
N-76364	Oil and Gas Lease		31-33	NA
N-79402	Oil and Gas Lease		19, 30	NA
N-83378	Oil and Gas Lease		16-18	NA
N-83379	Oil and Gas Lease		22, 27	NA
N-83380	Oil and Gas Lease		23-26	NA
N-83381	Oil and Gas Lease		34-36	NA
CC-022478	Highway	T22N, R52E	6-8, 16, 17, 21-23, 26, 27, 35	400
N-12655	Powerline		16-18, 21-24	25
N-58497	Buried Fiber Optic Line		6-8, 16, 17, 21-23, 26, 36	20
N-0 001471	Highway		6	400
N-63162	Powerline	T23N, R51E	1, 11, 12, 14, 23, 26, 35	160
N-83392	Oil and Gas Lease		23-26	NA
N-83394	Oil and Gas Lease		34, 35, 36	NA
N-58497	Telephone Line	T23N, R52E	6, 7, 18, 19, 30, 31	20
N-0 001471	Highway		6, 7, 18, 19, 30, 31	400
N-0 001417	Material Site		31	NA
N-78976	Oil and Gas Lease		19-21, 28-33	NA

[1] NA: Not applicable
VAR: Variable

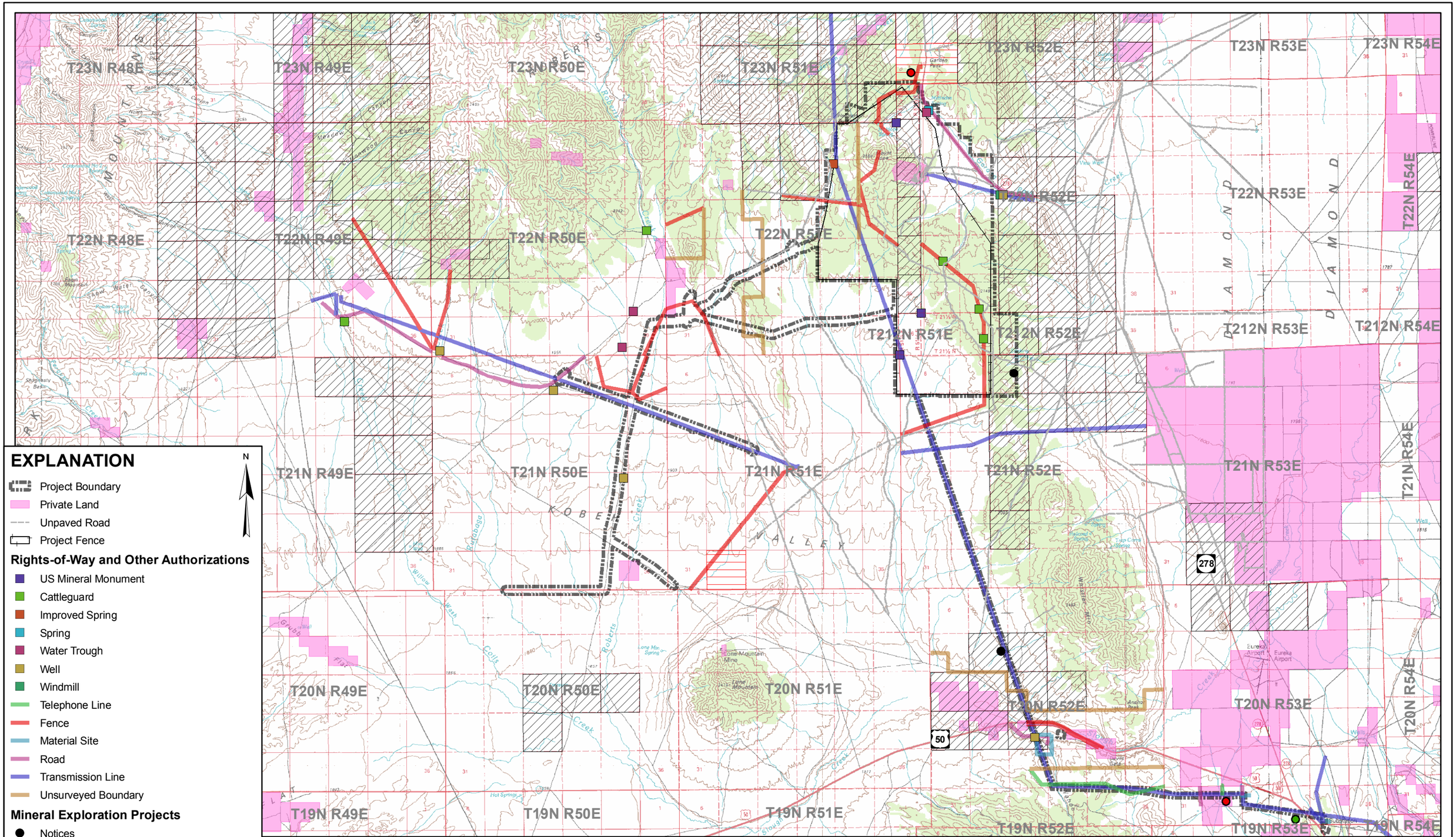
3.14.3.2 Assessment Methodology

The Proposed Action and alternatives are compared with existing land uses, land use plans, any relevant goals, policies, and decisions of those plans, to determine if they would adversely affect these land uses or conflict with existing land use plans. To evaluate impacts to access, the Proposed Action and alternatives were reviewed against existing conditions and federal and county land use plan policies. The significance criteria were then applied to determine if the adverse effects would be considered significant impacts if the Project or an alternative were implemented.

3.14.3.3 Proposed Action

3.14.3.3.1 Short-Term and Long-Term Loss of Public Lands

Implementation of the Proposed Action would result in the temporary disturbance of 8,3**55** acres of public lands managed for multiple uses and private land within the 14,204-acre fenced portion of the Project Area over as many as 70 years, which includes the mining and reclamation phases of the Project. The locations of the proposed disturbances and area fenced at the end of mining are identified on Figure 2.1.5, and the surface acreage by mine facility component is identified in Table 2.1-1. The fenced area would be temporarily unavailable for current land uses, which consist primarily of livestock grazing and mineral exploration. As outlined in Section 3.12, the Proposed Action would result in the loss of 781 AUMs in the Project Area, which represents a six percent loss of the active grazing preference in the Roberts Mountain and Romano



EXPLANATION

- Project Boundary
- Private Land
- Unpaved Road
- Project Fence

Rights-of-Way and Other Authorizations

- US Mineral Monument
- Cattleguard
- Improved Spring
- Spring
- Water Trough
- Well
- Windmill
- Telephone Line
- Fence
- Material Site
- Road
- Transmission Line
- Unsurveyed Boundary

Mineral Exploration Projects

- Notices
- Plans of Operations
- Gravel Operations

Oil and Gas Leases

- Authorized
- Pending

N

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

0 1 2 3 4 5 6 7 Miles

IF THE ABOVE BAR DOES NOT SCALE 1 INCH, THE DRAWING SCALE IS ALTERED

BATTLE MOUNTAIN DISTRICT OFFICE
Mount Lewis Field Office
50 Bastian Road
Battle Mountain, Nevada 89820

DESIGN:	DRAWN:	REVIEWED:
EMLLC	CVD/GSL	RFD
CHECKED:	APPROVED:	DATE:
-	RFD	08/23/2012

FILE NAME: p1635_Fig3-14-1_LandUseAuthorizations.mxd

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Land Use Authorizations Within and Adjacent to the Project Area

Figure 3.14.1

Allotments. As described in Section 2.1.17, EML would reclaim the Project Area to provide a post-mining surface condition that would be consistent with the expected long-term land uses, wildlife habitat, livestock grazing, **wild horse habitat,** and possible future mining-related activities.

The open pit, which comprises 734 acres, would not be reclaimed to the pre-mining land use. Following the cessation of mining and open pit dewatering, ground water would be allowed to enter and accumulate within the open pit, forming a pit lake. The BLM has no plans to develop this water-filled pit for recreational purposes. As described in the Proposed Action, to ensure public safety and prevent vehicular and deter livestock access, reclamation of the open pit would include construction of a physical perimeter barricade.

- **Impact 3.14.3.3-1:** Public lands currently utilized for livestock grazing**, wild horse habitat,** and mineral exploration would be removed from use as a result of the construction and operation of the Project. The Proposed Action would result in the removal of 14,204 acres from multiple use as a result of the Project facilities and fencing for the life of the Project. In addition, 8,3**55** acres of disturbance would occur within the fenced portion of the Project Area. Reclamation would be completed for 7,6**21** acres, or 9**1** percent, of the disturbed area (Section 2.1.17). Approximately 734 acres of public land in the vicinity of the open pit would not be reclaimed to the pre-mining land use.

  Significance of the Impact: This impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.14.3.3.2 Impacts to Land Use Authorizations

The Proposed Action would not result in any impacts or changes to land ownership within the Project Area. As described in the Proposed Action, the Project would result in some changes to the existing ROWs and other authorizations within the Project Area. ROWs proposed for the Project include the following: a 230-kV transmission line from the Machacek Substation to the Project Substation located near the proposed mill; and a ROW (N-63162) amendment associated with the reroute of the 345-kV Falcon-Gondor transmission line. A powerline (ROW N-12655) that extends from SR 278 to the historic Hope Mine would be affected by the construction of the Project processing facilities (Figure 3.14.1). In addition, the BLM has approved three cattle guards and three fences as range improvement and constructed two mineral monuments within the mine area portion of the Project Area that would be altered or removed as part of the Proposed Action (Figure 3.14.1).

The transmission line from Machacek Substation to the Project can be reclaimed after mining. Wells located in the Kobeh Valley Well Field area would be plugged and abandoned at the cessation of mining and reclamation. The Falcon-Gondor transmission line that would be rerouted would be left in place. The BLM would be notified if the ROW or a portion of the ROW would be relinquished by EML. The BLM would subsequently amend the ROW grant as required.

- **Impact 3.14.3.3-2:** Public lands currently occupied by ROWs and other land use authorizations would be altered, which would result in the alteration or removal of up to 15 ROWs and other land use authorizations.

  Significance of the Impact: This impact is considered less than significant; however, mitigation measures are considered appropriate.

- **Mitigation Measure 3.14.3.3-2:** EML would, in consultation with the BLM and authorized holders of the affected ROWs, reestablish the structures that would be altered or removed, as appropriate.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of this mitigation measure would be effective at maintaining the impact level as less than significant by reestablishing the authorized structures that would be removed or altered during Project construction and operation.

3.14.3.3.3 Land Use Plans and Goals

Plans and regulations currently in place to guide development in Eureka County include the following: Eureka County Master Plan (2010); Titles 8 and 9 of the Eureka County Code; and the BLM's RMP (BLM 1986a). The Proposed Action would not conflict with any federal land use plans or regulations. EML's proposed use of public lands under the Proposed Action is reasonably incident under the BLM's occupancy regulations at 43 CFR 3715. Some elements of the Proposed Action would be in conformance with Eureka County plans and policies while other elements of the proposed mine could prove inconsistent with these plans and policies. Potential inconsistencies identified by Eureka County are disclosed in Appendix A with a discussion of the efforts to reconcile or the rationale of the decision maker where reconciliation has not been achieved. The Proposed Action would not otherwise impact land use authorizations.

3.14.3.3.4 Disruption or Division of an Established Community

The Proposed Action would not disrupt or divide the physical arrangement of an established community. As described previously in Section 3.14.2.1.1, Existing Conditions, the closest community to the Project Area is the Town of Eureka, approximately 23 miles southeast of the Project Area. The closest residences to the Project Area are the Roberts and Alpha ranches, approximately five miles northwest and north, respectively. The existing land uses within the Project Area consist primarily of livestock grazing**, wild horse habitat,** and mineral exploration. Since there is no established community within the Project Area or within the vicinity of the Project Area, the Proposed Action would not disrupt or divide the physical arrangement of an established community.

3.14.3.3.5 Impacts to Private Land Uses

The Proposed Action has the potential to result in indirect impacts to private lands that are in the vicinity of the Project. Private lands controlled by EML are not included in this analysis (refer to the Proposed Action in Section 2.1 for a description of direct effects to EML's private land). The potential indirect effects are a result of the ground water drawdown resulting for Project pumping activities. Section 3.2.3 of the EIS describes those

ground water effects. The potential indirect effects to private land include the lowering of the water levels in wells (see Section 3.2.3), the reduction of flows in creeks that cross the private land (see Section 3.2.3), or a decrease in vegetation that is reliant of surface water or near surface ground water (see Sections 3.2.3, 3.9.3, and 3.11.3). In addition, there could be a reduction in the water that is available for agricultural irrigation of livestock watering (see Section 3.12.3).

- **Impact 3.14.3.3-3: The Proposed Action would have a potential indirect effect to private land uses as a result of ground water drawdown.**

  Significance of the Impact: This impact is considered potentially significant; however, mitigation measures described in Section 3.2.3 are considered appropriate to reduce the impact to less than significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures. See Section 3.26 for suggested mitigation outside the BLM's jurisdiction.

3.14.3.3.6 Residual Adverse Impacts

The Proposed Action would result in the unavoidable loss of 734 acres of public lands utilized for livestock grazing**, wild horse habitat,** and mineral exploration resulting from surface disturbance associated with the open pit; however, there would be no residual impacts to land use.

3.14.3.4 No Action Alternative

3.14.3.4.1 Short-Term and Long-Term Loss of Public Lands

Under the No Action Alternative, EML is currently authorized under **seven** Notices to disturb approximately 3**5** acres of public land as a result of the exploration and development of the Project. Facilities and operations that have been approved but not yet completed would have impacts on land use and access. Public lands managed for multiple uses within the Project Area that have been proposed for surface disturbance and fencing would remain accessible.

No additional public lands would be removed from multiple use management, and impacts to land use would be limited to ongoing permitted mining and exploration activities.

3.14.3.4.2 Impacts to Land Use Authorizations

Under the No Action Alternative, EML is currently authorized under **seven** Notices to disturb approximately 3**5** acres of public land as a result of the exploration and development of the Project. Continuation of these Notices would be required to adhere to regional and local land use plans and regulations similar to the Proposed Action, which include: the Eureka County Master Plan (2010); the Natural Resources and Federal or State Land Use Element of the Eureka County Master Plan; and the BLM's RMP (BLM 1986a). Therefore, the No Action Alternative would not result in impacts to land use authorizations.

3.14.3.4.3 Land Use Plans and Goals

The No Action Alternative would not conflict with land use plans and regulations currently in place to guide development in Eureka County. These plans and regulations include the following: the Eureka County Master Plan (2010); the Natural Resources and Federal or State Land Use Element of the Eureka County Master Plan; and the BLM's RMP (BLM 1986a). The No Action Alternative would not otherwise impact land use authorizations.

3.14.3.4.4 Disruption or Division of an Established Community

Under the No Action Alternative, EML would continue existing surface disturbing activities within the Project Area. As discussed previously, there is no established community within the Project Area or in the vicinity of the Project Area. Therefore, there would be no impacts to the disruption or division of the physical arrangement of an established community under the No Action Alternative.

3.14.3.4.5 Impacts to Private Land Uses

Under the No Action Alternative there would be no indirect impacts to private lands that are in the vicinity of the Project.

3.14.3.4.6 Residual Adverse Impacts

There would be no residual impacts to land use under the No Action Alternative, other than those impacts caused by permitted operations at the Project.

3.14.3.5 Partial Backfill Alternative

3.14.3.5.1 Short-Term and Long-Term Loss of Public Lands

Implementation of the Partial Backfill Alternative would result in the temporary disturbance of 8,3**55** acres of public lands managed for multiple uses and private land within the 14,204-acre fenced portion of the Project Area over as much as 70 years, which include the mining and reclamation phases of the Project. The locations of the proposed disturbances and fenced area are identified on Figure 2.1.5. The end of mining surface acreage by mine facility component is identified in Table 2.1-1. The fenced area would be temporarily unavailable for current land uses, which consist primarily of livestock grazing**, wild horse habitat,** and mineral exploration. As outlined in Section 3.12, the Partial Backfill Alternative would result in the loss of 781 AUMs in the Project Area, which represents six percent loss of the active grazing preference in the Roberts Mountain and Romano Allotments. As described in Section 2.1.17, EML would reclaim the Project Area to provide a post-mining surface condition that would be consistent with the expected long-term land uses, wildlife habitat, livestock grazing, **wild horse habitat,** and possible future mining-related activities.

The backfilled portion of the open pit would be reclaimed (527 acres), which would leave the remaining open pit highwalls that would not be reclaimed to the pre-mining land use, which comprises 206 acres; however, to ensure public safety and prevent vehicular and deter livestock access, reclamation of the open pit would include construction of a physical perimeter barricade, which is similar to the Proposed Action. As a result, there would be less of an impact to long-term loss of public lands.

- **Impact 3.14.3.5-1:** Public lands currently utilized for livestock grazing**, wild horse habitat,** and mineral exploration would be removed from use as a result of the construction and operation of the Project. The **Partial Backfill Alternative** would result in the removal of 14,204 acres from multiple use as a result of the Project facilities and fencing. In addition, 8,3**55** acres of disturbance would occur within the fenced portion of the Project Area. Reclamation would be completed for 7,6**21** acres, or 9**1** percent, of the disturbed area (Section 2.1.17). Approximately 734 acres of public land in the vicinity of the open pit would be partially reclaimed, but not available to wildlife habitat pre-mining land use.

  Significance of the Impact: This impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.14.3.5.2 Impacts to Land Use Authorizations

The Partial Backfill Alternative would not result in any impacts or changes to land ownership within the Project Area. This alternative would result in some changes to the existing ROWs within the Project Area. Changes to the existing ROWs proposed for the Project include the following: a 230-kV transmission line from the Machacek Substation to the Project Substation located near the proposed mill; and a ROW amendment associated with the reroute of the 345-kV Falcon-Gondor transmission line. In addition, the BLM has authorized three windmills, and three fences as range improvements and constructed three mineral monuments within the mine area portion of the Project Area that would be either altered or removed as part of the Proposed Action.

The transmission line from Machacek Substation to the Project can be reclaimed after mining. Wells located in the Kobeh Valley Well Field area would be plugged and abandoned at the cessation of mining and reclamation. The Falcon-Gondor transmission line that would be rerouted would be left in place. The BLM would be notified if the ROW or a portion of the ROW would be relinquished by EML. The BLM could subsequently amend the ROW grant as required.

- **Impact 3.14.3.5-2:** Public lands currently occupied by ROWs and land use authorizations would be altered, which would result in the alteration or removal of up to 15 ROWs and land use authorizations.

  Significance of the Impact: This impact is considered less than significant; however, mitigation measures are considered appropriate.

- **Mitigation Measure 3.14.3.5-2:** EML would, in consultation with the BLM and authorized holders of the affected ROWs, reestablish the structures that would be altered or removed, as appropriate.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of this mitigation measure would be effective at maintaining the impact level as less than significant by reestablishing the authorized structures that would be removed or altered during Project construction and operation.

3.14.3.5.3 Land Use Plans and Goals

Plans and regulations currently in place to guide development in Eureka County include the Eureka County Master Plan (2010); Titles 8 and 9 of the Eureka County Code; and the BLM's RMP (BLM 1986a). The Proposed Action would not conflict with any federal land use plans or regulations. EML's proposed use of public lands under the proposed action is reasonably incident under the BLM's occupancy regulations at 43 CFR 3715. Some elements of the Proposed Action would be in conformance with Eureka County plans and policies while other elements of the proposed mine could prove inconsistent with these plans and policies. Potential inconsistencies identified by Eureka County are disclosed in Appendix A with an indication if each conflict has been reconciled and either the method of reconciliation if it has or the rationale of the decision maker where reconciliation has not been achieved. The Partial Backfill Alternative would not otherwise impact land use authorizations.

3.14.3.5.4 Disruption or Division of an Established Community

The Partial Backfill Alternative would only disturb lands within the Project Area. As previously discussed, there is no established community within the Project Area or within the vicinity of the Project Area. Therefore, the Partial Backfill Alternative would not disrupt or divide the physical arrangement of an established community.

3.14.3.5.5 Impacts to Private Land Uses

The Partial Backfill Alternative has the potential to result in indirect impacts to private lands that are in the vicinity of the Project. Private lands controlled by EML are not included in this analysis (refer to the Proposed Action in Section 2.1 for a description of direct effects to EML's private land). The potential indirect effects are a result of the ground water drawdown resulting for Project pumping activities. Section 3.2.3 of the EIS describes those ground water effects. The potential indirect effects to private land include the lowering of the water levels in wells (see Section 3.2.3), the reduction of flows in creeks that cross the private land (see Section 3.2.3), or a decrease in vegetation that is reliant of surface water or near surface ground water (see Sections 3.2.3, 3.9.3, and 3.11.3). In addition, there could be a reduction in the water that is available for agricultural irrigation of livestock watering (see Section 3.12.3).

- **Impact 3.14.3.5-3: The Partial Backfill Alternative would have a potential indirect effect to private land uses as a result of ground water drawdown.**

  Significance of the Impact: This impact is considered potentially significant; however, mitigation measures described in Section 3.2.3 are considered appropriate to reduce the impact to less than significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures. See Section 3.26 for suggested mitigation outside the BLM's jurisdiction.

3.14.3.5.6 Residual Adverse Impacts

The Partial Backfill Alternative would result in the unavoidable loss of 734 acres of public lands utilized for livestock grazing**, wild horse habitat,** and mineral exploration, resulting from surface disturbance of the open pit area.

3.14.3.6 Off-Site Transfer of Ore Concentrate for Processing Alternative

3.14.3.6.1 Short-Term and Long-Term Loss of Public Lands

Implementation of the Off-Site Transfer of Ore Concentrate for Processing Alternative would result in the temporary disturbance of 8,3**55** acres of public lands managed for multiple uses and private land within the 14,204-acre fenced portion of the Project Area over as much as 70 years, which include the mining and reclamation phases of the Project. The locations of the proposed disturbances and fenced area are identified on Figure 2.1.5. The end of mining surface acreage by mine facility component is identified in Table 2.1-1. The fenced area would be temporarily unavailable for current land uses, which consist primarily of livestock grazing**, wild horse habitat,** and mineral exploration. As outlined in Section 3.12, the Off-Site Transfer of Ore Concentrate for Processing Alternative would result in the loss of 781 AUMs which represents a six percent loss of the active grazing preference in the Roberts Mountain and Romano Allotments. As described in Section 2.1.17, EML would reclaim the Project Area to provide a post-mining surface condition that would be consistent with the expected long-term land uses, wildlife habitat, livestock grazing, **wild horse habitat,** and possible future mining-related activities.

The open pit, which comprises 734 acres, would not be reclaimed to the pre-mining land use. Following the cessation of mining and open pit dewatering, ground water would be allowed to enter and accumulate within the open pit, forming a pit lake. The BLM has no plans to develop this water-filled pit for recreational purposes. As described in the Off-Site Transfer of Ore Concentrate for Processing Alternative, to ensure public safety and prevent vehicular and deter livestock access, reclamation of the open pit would include construction of a physical perimeter barricade. As a result, there would be less of an impact to long-term loss of public lands.

- **Impact 3.14.3.6-1:** Public lands currently utilized for livestock grazing**, wild horse habitat,** and mineral exploration would be removed from use as a result of the construction and operation of the Project. The Off-Site Transfer of Ore Concentrate for Processing Alternative would result in the removal of 14,204 acres from multiple use as a result of the Project facilities and fencing. In addition, 8,3**55** acres of disturbance would occur within the fenced portion of the Project Area. Reclamation would be completed for 7,6**21** acres, or 9**1** percent, of the disturbed area (Section 2.1.17). Approximately 734 acres of public land in the vicinity of the open pit would not be reclaimed to the pre-mining land use.

  Significance of the Impact: This impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.14.3.6.2 Impacts to Land Use Authorizations

The Off-Site Transfer of Ore Concentrate for Processing Alternative would not result in any impacts or changes to land ownership within the Project Area. As described in the Off-Site Transfer of Ore Concentrate for Processing Alternative, the Project would result in some changes to the existing ROWs within the Project Area. Changes to the existing ROWs proposed for the Project include the following: a 230-kV transmission line from the Machacek Substation to the Project Substation located near the proposed mill; and a ROW amendment associated with the reroute of the 345 kV Falcon-Gondor transmission line. In addition, the BLM has authorized three windmills, and three fences as range improvements and constructed three mineral monuments within the mine area portion of the Project Area that would either be altered or removed as part of the Off-Site Transfer of Ore Concentrate for Processing Alternative.

The transmission line from Machacek Substation to the Project can be reclaimed after mining. Wells located in the Kobeh Valley Well Field area would be plugged and abandoned at the cessation of mining and reclamation. The Falcon-Gondor transmission line that would be rerouted would be left in place. The BLM would be notified if the ROW or a portion of the ROW would be relinquished by EML. The BLM could subsequently amend the ROW grant as required.

- **Impact 3.14.3.6-2:** Public lands currently occupied by ROWs and land use authorizations would be altered, which would result in the alteration or removal of up to 15 ROWs and land use authorizations.

  Significance of the Impact: This impact is considered less than significant; however mitigation measures are considered appropriate.

- **Mitigation Measure 3.14.3.6-2:** EML would, in consultation with the BLM and authorized holders of the affected ROWs, reestablish the structures that would be altered or removed, as appropriate.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of this mitigation measure would be effective at maintaining the impact level as less than significant by reestablishing the authorized structures that would be removed or altered during Project construction and operation.

3.14.3.6.3 Land Use Plans and Goals

Plans and regulations currently in place to guide development in Eureka County include the Eureka County Master Plan (2010); Titles 8 and 9 of the Eureka County Code; and the BLM's RMP (BLM 1986a). The Proposed Action would not conflict with any federal land use plans or regulations. EML's proposed use of public lands under the proposed action is reasonably incident under the BLM's occupancy regulations at 43 CFR 3715. Some elements of the Proposed Action would be in conformance with Eureka County plans and policies while other elements of the proposed mine could prove inconsistent with these plans and policies. Potential inconsistencies identified by Eureka County are disclosed in Appendix A with an indication if each conflict has been reconciled and either the method of reconciliation if it has or the rationale of the decision maker where reconciliation has not

been achieved. The Off-Site Transfer of Ore Concentrate for Processing Alternative would not otherwise impact land use authorizations.

3.14.3.6.4 Disruption or Division of an Established Community

The Off-Site Transfer of Ore Concentrate for Processing Alternative would only disturb lands within the Project Area. As previously discussed, there is no established community within the Project Area or within the vicinity of the Project Area. Therefore, the Off-Site Transfer of Ore Concentrate for Processing Alternative would not disrupt or divide the physical arrangement of an established community from the Partial Backfill Alternative.

3.14.3.6.5 Impacts to Private Land Uses

The Off-Site Transfer of Ore Concentrate for Processing Alternative has the potential to result in indirect impacts to private lands that are in the vicinity of the Project. Private lands controlled by EML are not included in this analysis (refer to the Proposed Action in Section 2.1 for a description of direct effects to EML's private land). The potential indirect effects are a result of the ground water drawdown resulting for Project pumping activities. Section 3.2.3 of the EIS describes those ground water effects. The potential indirect effects to private land include the lowering of the water levels in wells (see Section 3.2.3), the reduction of flows in creeks that cross the private land (see Section 3.2.3), or a decrease in vegetation that is reliant of surface water or near surface ground water (see Sections 3.2.3, 3.9.3, and 3.11.3). In addition, there could be a reduction in the water that is available for agricultural irrigation of livestock watering (see Section 3.12.3).

- **Impact 3.14.3.6-3: The Off-Site Transfer of Ore Concentrate for Processing Alternative would have a potential indirect effect to private land uses as a result of ground water drawdown.**

  Significance of the Impact: This impact is considered potentially significant; however, mitigation measures described in Section 3.2.3 are considered appropriate to reduce the impact to less than significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures. See Section 3.26 for suggested mitigation outside the BLM's jurisdiction.

3.14.3.6.6 Residual Adverse Impacts

The Off-Site Transfer of Ore Concentrate for Processing Alternative would result in the unavoidable loss of 734 acres of public lands utilized for livestock grazing**, wild horse habitat,** and mineral exploration, resulting from surface disturbance of the open pit area.

3.14.3.7 Slower, Longer Project Alternative

Impacts to land use from the Slower, Longer Project Alternative are expected to be similar to impacts from the Proposed Action at the end of the Project; however, impacts from the Slower, Longer Project Alternative would occur over a period approximately twice as long in duration compared to the Proposed Action.

3.14.3.7.1 Short-Term and Long-Term Loss of Public Lands

Implementation of the Slower, Longer Project Alternative would result in the temporary disturbance of 8,3**55** acres of public lands managed for multiple uses and private land within the 14,204-acre fenced portion of the Project Area over as much as 115 years, which include the mining and reclamation phases of the Project. The locations of the proposed disturbances and fenced area are identified on Figure 2.1.5. The end of mining surface acreage by mine facility component is identified in Table 2.1-1. The fenced area would be temporarily unavailable for current land uses, which consist primarily of livestock grazing**, wild horse habitat,** and mineral exploration. As outlined in Section 3.12, the Slower, Longer Project Alternative would result in the loss of 781 AUMs which represents a six percent loss of the active grazing preference in the Roberts Mountain and Romano Allotments. As described in Section 2.1.17, EML would reclaim the Project Area to provide a post-mining surface condition that would be consistent with the expected long-term land uses, wildlife habitat, livestock grazing, **wild horse habitat,** and possible future mining-related activities.

The open pit, which comprises 734 acres, would not be reclaimed to the pre-mining land use. Following the cessation of mining and open pit dewatering, ground water would be allowed to enter and accumulate within the open pit, forming a pit lake. The BLM has no plans to develop this water-filled pit for recreational purposes. As described in the Slower, Longer Project Alternative, to ensure public safety and prevent vehicular and deter livestock access, reclamation of the open pit would include construction of a physical perimeter barricade. As a result, there would be less of an impact to long-term loss of public lands.

- **Impact 3.14.3.7-1:** Public lands currently utilized for livestock grazing**, wild horse habitat,** and mineral exploration would be removed from use as a result of the construction and operation of the Project. The Slower, Longer Project Alternative would result in the removal of 14,204 acres from multiple use as a result of the Project facilities and fencing. In addition, 8,3**55** acres of disturbance would occur within the fenced portion of the Project Area. Reclamation would be completed for 7,6**21** acres, or 9**1** percent, of the disturbed area (Section 2.1.17). Approximately 734 acres of public land in the vicinity of the open pit would not be reclaimed to the pre-mining land use.

  Significance of the Impact: This impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.14.3.7.2 Impacts to Land Use Authorizations

The Slower, Longer Project Alternative would not result in any impacts or changes to land ownership within the Project Area. As described in the Slower, Longer Project Alternative, the Project would result in some changes to the existing ROWs within the Project Area. Changes to the existing ROWs proposed for the Project include the following: a 230-kV transmission line from the Machacek Substation to the Project Substation located near the proposed mill; and a ROW amendment associated with the reroute of the 345 kV Falcon-Gondor transmission line. In addition, the BLM has authorized three windmills, and three fences as range improvements and constructed three mineral monuments within the mine area portion of the Project Area that would either be altered or removed as part of the Slower, Longer Project Alternative.

The transmission line from Machacek Substation to the Project can be reclaimed after mining. Wells located in the Kobeh Valley Well Field area would be plugged and abandoned at the cessation of mining and reclamation. The Falcon-Gondor transmission line that would be rerouted would be left in place. The BLM would be notified if the ROW or a portion of the ROW would be relinquished by EML. The BLM could subsequently amend the ROW grant as required.

- **Impact 3.14.3.7-2:** Public lands currently utilized for ROWs **and other land use authorizations** would be altered, which would result in the alteration or removal of up to 15 ROWs **and other land use authorizations**.

  Significance of the Impact: This impact is considered less than significant; however, mitigation measures are considered appropriate.

- **Mitigation Measure 3.14.3.7-2:** EML would, in consultation with the BLM and authorized holders of the affected ROWs **and other land use authorizations**, reestablish the structures that would be altered or removed, as appropriate.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of this mitigation measure would be effective at maintaining the impact level as less than significant by reestablishing the authorized structures that would be removed or altered during Project construction and operation.

3.14.3.7.3 Land Use Plans and Goals

Plans and regulations currently in place to guide development in Eureka County include the Eureka County Master Plan (2010); Titles 8 and 9 of the Eureka County Code; and the BLM's RMP (BLM 1986a). The Proposed Action would not conflict with any federal land use plans or regulations. EML's proposed use of public lands under the proposed action is reasonably incident under the BLM's occupancy regulations at 43 CFR 3715. Some elements of the Proposed Action would be in conformance with Eureka County plans and policies while other elements of the proposed mine could prove inconsistent with these plans and policies. Potential inconsistencies identified by Eureka County are disclosed in Appendix A with an indication if each conflict has been reconciled and either the method of reconciliation if it has or the rationale of the decision maker where reconciliation has not been achieved. The Slower, Longer Project Alternative would not otherwise impact land use authorizations.

3.14.3.7.4 Disruption or Division of an Established Community

The Slower, Longer Project Alternative would not disrupt or divide the physical arrangement of an established community.

3.14.3.7.5 Impacts to Private Land Uses

The Slower, Longer Project Alternative has the potential to result in indirect impacts to private lands that are in the vicinity of the Project. Private lands controlled by EML are not included in this analysis (refer to the Proposed Action in Section 2.1 for a description of direct effects to the EML private land). The potential indirect effects are a result of the

ground water drawdown resulting for Project pumping activities. Section 3.2.3 of the EIS describes those ground water effects. The potential indirect effects to private land include the lowering of the water levels in wells (see Section 3.2.3), the reduction of flows in creeks that cross the private land (see Section 3.2.3), or a decrease in vegetation that is reliant of surface water or near surface ground water (see Sections 3.2.3, 3.9.3, and 3.11.3). In addition, there could be a reduction in the water that is available for agricultural irrigation of livestock watering (see Section 3.12.3).

- **Impact 3.14.3.7-3: The Slower, Longer Project Alternative would have a potential indirect effect to private land uses as a result of ground water drawdown.**

  Significance of the Impact: This impact is considered potentially significant; however, mitigation measures described in Section 3.2.3 are considered appropriate to reduce the impact to less than significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures. See Section 3.26 for suggested mitigation outside the BLM's jurisdiction.

3.14.3.7.6 Residual Adverse Impacts

The Slower, Longer Project Alternative would result in the unavoidable loss of 734 acres of public lands utilized for livestock grazing**, wild horse habitat,** and mineral exploration, resulting from surface disturbance of the open pit area.

3.15 Recreation and Wilderness Study Areas

3.15.1 Regulatory Framework

Federal, state, and local laws, regulations, guidelines, and procedures that apply to the management of recreation and wilderness resources include the following: Eureka County Master Plan; Nevada Statewide Comprehensive Outdoor Recreation Plan (SCORP); FLPMA; RMP; Land and Resource Management Plan for the Toiyabe National Forest; Wilderness Act of 1964, as amended; BLM Manual 8560/H-8560-1 (Management of Designated Wilderness Areas); BLM Manual 8561 (Wilderness Management Plans); and Interim Management Policy (IMP) for Lands Under Wilderness Review H-8550-1.

The Eureka County 1973 Master Plan, updated in 2010, contains a description of land uses, restrictions on development, and recommendations for future land use planning. The Natural Resources and Federal or State Land Use Element updated in 2000 and again in 2010, was originally developed and included into the Plan in response to Nevada **SB** 40 (1983) which directs counties to develop plans and strategies for resources that occur within lands managed by federal and state agencies. Hunting, fishing, and outdoor recreation is specifically addressed in the Natural Resources and Federal or State Land Use Element of the Master Plan, which describes and establishes the following recreation goals:

> Provide for multiple recreation uses on Eureka County federal and state administered lands located within its boundaries for residents and visitors to the County. Provide recreational uses including high quality recreational opportunities and experiences at

> developed and dispersed/undeveloped recreation sites by allowing historic uses and access while maintaining existing amenities and by providing new recreation sites for public enjoyment. Pursue increased public access opportunities in both motorized and non-motorized settings through the acquisition of ROWs or easements across federal administered lands and private lands at the invitation of the property owner. Recognize that multiple recreation uses are mandated by the multiple use concepts and that adequate outdoor recreation resources must be provided on the federal administered areas; keeping open all existing access roads and the ability to maintain those same roads or accesses (Eureka County 2010).

The Nevada SCORP "provides information and recommendations to minimize uncertainty in the decision-making process of allocating outdoor recreation resources. In Nevada, the SCORP is the framework for the presentation and dissemination of outdoor recreation information on a statewide basis" (Nevada Division of State Parks 2010). Completion of the SCORP completed in 2010 is one of the requirements for the state to maintain eligibility for federal financial assistance through the Land and Water Conservation Fund Act of 1965 and the SCORP guides the expenditure of money provided through this program. The SCORP also provides a means for coordination between recreation providers in the state and enables each provider to assess their operations and to consider issues, actions, activities, and needs on a statewide level. The goal of the SCORP is to increase and improve the quality of outdoor recreation opportunities in Nevada (Nevada Division of State Parks 2010). The SCORP also includes specific strategies to address the most pressing outdoor recreational issues. Strategy Four specifically states, "Promote conservation of statewide water resources and wildland areas. Strive to work with partners to gain landscape level conservation: river, riparian and natural water bodies, and land conservation for wildlife and their habitats" (Nevada Division of State Parks 2010, page 27).

As shown in Figure 3.15.1, there are no designated wilderness areas within or adjacent to the study area for recreation and wilderness; however, the Roberts Mountain Wilderness Study Area (WSA) and a portion of the Simpson Park WSA are within the study area. The BLM's IMP for Lands Under Wilderness Review (BLM 1995) guides management decisions made for specific areas of public lands under wilderness review by Congress. The policy applies to the following: (a) WSAs identified by the wilderness review required by Section 603 of the FLPMA; (b) WSAs established by Congress; and (c) WSAs identified through the land use planning process in Section 202 of FLPMA. The purpose of the IMP is to prevent impairment of the wilderness values, described in Section 2 (c) of the Wilderness Act of 1964 (P.L. 88/577). WSAs are managed under the IMP until such time as Congress makes a determination regarding wilderness designation. The IMP would apply to the WSAs in the study area; however, there are no WSAs located within the Project Area (Figure 3.15.1).

The study area is located primarily on public land within the Shoshone-Eureka Resource Area. A portion of the study area is also located on **National Forest System (**NFS**)** lands within the Humboldt-Toiyabe National Forest, which is administered by the Austin Ranger District of the USFS. Recreation policies within the Shoshone-Eureka Resource Area and the Humboldt-Toiyabe National Forest are guided by the BLM's RMP and the USFS's Land and Resource Management Plan for the Toiyabe National Forest, respectively. The majority of the lands within the Project Area and the study area are designated for multiple use.

3.15.2 Affected Environment

3.15.2.1 Study Methods

The baseline data presented below are based on information from public agency maps and reports including the Nevada SCORP and from communications with federal, state, county, and community officials.

The study area for recreation and wilderness resources is defined as an area generally bounded by the Simpson Park Range, Pine Valley, Newark Valley and approximately 30 miles south of Eureka, which includes the Fish Creek Range, Mahogany Hills, Ninemile Peak, and the northern portions of the Antelope and Monitor Ranges (Figure 3.15.1). This area was based on topography and inclusion of areas typically used by residents of Eureka and Diamond Valley. All federal, state, local, and private recreation areas are included within the study area and are outlined under the existing conditions subsection.

3.15.2.2 Existing Conditions

3.15.2.2.1 Recreation

Dispersed recreation is the predominant type of recreation within the study area and the surrounding region. The area attracts thousands of visitors annually because a wide variety of outdoor recreation activities occur on BLM-administered lands. There is one developed recreation site, Hickison Petroglyph Recreation Site. All other recreation is of a dispersed nature. The most popular recreation activities include sightseeing, pleasure driving, rock collecting, photography, winter sports, off-highway vehicle **(OHV)** use, mountain biking, picnicking, camping, fishing, hunting, horseback riding, and hiking. This wide range of opportunities is possible because virtually all of the public lands in the study area are accessible and offer a variety of settings suitable for different recreational activities. Dispersed recreational activities have not required major improvements for recreational purposes, as existing roads and trails are the primary facilities associated with these activities, and visitors usually travel on a previously used or marked motorized vehicle route to reach a recreation site or trailhead. Surface disturbance has occurred as a result of dispersed recreation activities and is evaluated in the cumulative impacts discussion (Chapter 4) to the extent possible. Disturbance from dispersed recreation cannot be readily quantified.

Recreational opportunities are grouped along a continuum of opportunities ranging from intensive vehicle-oriented activities at one end to non-motorized activities undertaken in a primitive setting at the other, although there is often overlap between the two. Table 3.15-1 lists the recreational areas, or portions of recreational areas, within the study area and the estimated annual visitors for 2006.

High Use Recreation Areas

Hickison Petroglyph Recreation Site

The Hickison Petroglyph Recreation Site is located approximately 24 miles east of Austin, Nevada, along U.S. Highway 50. The site is the most popular recreational destination in the study area with more than 21,000 visitors in 2006. Recreational opportunities at this site include

ELKO COUNTY

ROBERTS MOUNTAIN WSA

LANDER COUNTY

SIMPSON PARK WSA

EUREKA COUNTY

278

50

Eureka

WHITE PINE COUNTY

NYE COUNTY

ANTELOPE RANGE WSA

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

EXPLANATION

- Project Boundary
- Restricted Access Area
- Wilderness Study Areas (WSAs)
- Analysis/Study Area for Recreation and Wilderness Resources
- Pony Express Trail

BLM Recreation Sites

- Hickson Petroglyph Site
- Tonkin Spring

N

0 2 4 6 8 10 Miles

DESIGN: EMLLC	DRAWN: CVD/GSL	REVIEWED: RFD	
CHECKED: -	APPROVED: RFD	DATE: 08/01/2012	
FILE NAME: p1635_Fig3-15-1_Wilderness&Rec.mxd			

BATTLE MOUNTAIN DISTRICT OFFICE
Mount Lewis Field Office
50 Bastian Road
Battle Mountain, Nevada 89820

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Wilderness Study Areas and Recreation Sites

Figure 3.15.1

petroglyph viewing, hiking, picnicking, camping, and horseback riding. Originally developed in 1968, the site has 16 camp sites, four picnic sites, three restrooms, and a 0.3 mile interpretive trail. Most visitors stay only 20 to 60 minutes; long enough to visit the petroglyphs. It is estimated that approximately 2,500 visitors a year spend at least one night in the campground. In 2005, 81 percent of the visitors who logged their name in the registration book at the site were from outside of Nevada and six percent were from outside of the U.S. Many visitors have visited the site on more than one occasion. An increasing number of visitors are considering the Hickison Petroglyph Recreation Site their destination rather than as a stopover on their way somewhere else. Recent developments at Hickison include construction of more than 13 miles of equestrian/hiker trails and installation of a trailhead with connector trails to the campground.

Table 3.15-1: Recreational Areas and Estimated Annual Visitors for 2006

Recreation Area	Estimated Annual Visitors
Antelope Range (Portion)	630
Hickison Petroglyph Recreation Site	21,870
Roberts Mountain	968
Roberts Mountain WSA	487
Simpson Park Mountains	739
Simpson Park WSA	150
Tonkin Spring	612
Pony Express National Historic Trail	230
Pony Express National Historic Trail Annual Re-ride	45
Dispersed Recreation	26,000
Total Estimated Recreation Visitors in the Study Area	51,731

Future funding would allow a total of 30 to 50 miles of trail to be built. The trail system would include a portion of the Pony Express National Historic Trail. Additional funding would also allow construction of new camp loops and improvements to existing facilities. Many visitors combine their visit to Hickison with a visit to the nearby Spencer Hot Springs, which is a popular natural hot spring site. Visitor feedback has shown a need for increased hiking/equestrian opportunities in the area.

Roberts Creek, Pete Hanson Creek, and Tonkin Springs

The Roberts Mountains in general, and Roberts Creek, Pete Hanson Creek, and Tonkin Springs in particular, are areas that receive a high level of use from locals and visitors. These areas provide numerous recreational opportunities, including fishing (Roberts Creek and Tonkin Reservoir are stocked by the NDOW), hiking, wildlife viewing, and hunting. Additionally, the Roberts Creek area is easily accessed by Southern Eureka County residents and used particularly for camping and fishing. Between 2000 and 2009, fishing use on Roberts Creek and Tonkin Reservoir **averaged** 17 and 101 anglers per year, respectively, and each angler caught seven and 16 fish respectively.

Organized Events or Special Recreation Permits

In 2006, all but one special recreation permit were for hunting related outfitting and guiding permits in the study area. The other permit was approved for XP Rides to conduct a Pony Express Trail re-ride in June of that year. The re-ride has been an annual event, conducted in June in recent years. The permit involves a re-ride for the entire Pony Express National Historic Trail across a multi-state area. The number of participants within the study area is estimated to be approximately 45 people for each event.

It is estimated that there are one to five guided hunts within the study area every year, each involving two to 25 participants. Due to the fact that permits are issued either statewide or for multiple BLM districts, the number of guided hunts in the area is highly variable and has been factored into the dispersed use visitor statistics.

Hunting

There are a variety of hunting opportunities in the general region. Common species hunted include mule deer, pronghorn antelope (*Antilocarpa americana*), mountain lion (*Puma concolor*), greater sage-grouse, chukar (*Alectoris chukar*), cottontail (*Sylvilagus nuttallii*), quail (*Oreortyx pictus*), pigeon (*Columba livia*), mourning dove (*Zenaidura macroura*), and waterfowl. Bighorn sheep (*Ovis canadensis*) and elk (*Cervus canadensis*) are also hunted in portions of the study area. Public scoping comments for the Project expressed concern over continued access for hunting in or near the Project Area.

The NDOW regulates big game hunting through a quota system, and tags are sold for each big game species in the various hunt units. The study area includes all of Hunt Units 142, 143, 145 and all but a very small portion of Hunt Unit 144. The study area overlaps portions of Hunt Units 65, 155, 161, 162, 163, 164, 131, and 108. The big game status and trend for the Project Area are discussed in Section 3.24 (Wildlife and Fisheries Resources). The big game hunt statistics for the hunt units that are within or that overlap the study area are shown in Table 3.15-2. The hunt unit statistics presented in Table 3.15-1 reflect the average number of animals harvested in each unit. This is a result of the statistics being divided by multiple hunt unit groups provided in the NDOW data (NDOW 20**10**).

Table 3.15-2: 2010 Harvest by Hunt Unit and Group

Hunt Unit	Bighorn Sheep			Elk			Mule Deer			Pronghorn Antelope		
	Tags	Number of Success	Percent of Success	Tags	Number of Success	Percent of Success	Tags	Number of Success	Percent of Success	Tags	Number of Success	Percent of Success
Hunt Units within the Recreation Study Area												
142	0	0	0	0	0	0	378	157	59	34	25	71
143	0	0	0	0	0	0	378	157	49	85	59	40
144[1]	0	0	0	0	0	0	386	161	53	31	23	74
145	0	0	0	0	0	0	368	151	34	69	49	49
Hunt Units that Overlap the Recreation Study Area												
65	4	4	100	0	0	0	52	33	62	41	25	47
155	0	0	0	0	0	0	125	133	57	105	64	37
161	14	11	82	183	80	51	560	196	43	18	16	70

Hunt Unit	Bighorn Sheep			Elk			Mule Deer			Pronghorn Antelope		
	Tags	Number of Success	Percent of Success	Tags	Number of Success	Percent of Success	Tags	Number of Success	Percent of Success	Tags	Number of Success	Percent of Success
162	4	4	100	183	80	51	560	196	43	18	16	70
163	4	4	100	183	80	51	561	197	49	70	49	37
164	3	2	67	183	80	51	560	196	43	70	49	37
131	4	4	100	90	51	68	86	47	42	76	54	46
108	0	0	0	30	20	63	4,055	1,048	42	94	55	54

[1]A very small portion of the Hunt Unit is outside the Recreation Study Area boundary.
Source: NDOW 2009-2010 Big Game Status (NDOW 2010)

SCORP

The SCORP identified the ten most popular outdoor recreation activities in the Nevada market region, which includes Nevada, California, Oregon, Idaho, Utah, and Arizona. These activities included walking for pleasure, family gatherings, viewing/photographing natural scenery, visiting nature centers, gardening or landscaping, picnicking, sightseeing, driving for pleasure, viewing/photographing wildflowers, and visiting historic sites (Nevada Division of State Parks 20**10**). Respondents to the SCORP said that the five outdoor recreation areas and facilities that are most needed outside their local community were camping, fishing, parks, hiking, and biking. The SCORP also ranked and weighted the top eight outdoor recreation issues in Nevada. The number one issue identified was public access to public lands for diverse outdoor recreation (Nevada Division of State Parks 20**10**). Additionally, SCORP's strategies emphasize water-based recreational opportunities which are provided at Roberts Creek, Pete Hanson, and Tonkin Springs.

Local and County Recreation Facilities

Tourism and recreation attractions in southern Eureka County include hunting, sightseeing, off-road vehicle use, visits to the Eureka Opera House and Sentinel Museum, wild horse viewing, general interest in the historic mining character of the community, and events such as the county fair, the county youth fair, the high school rodeo and a series of horse shows, softball tournaments, and shooting and archery tournaments. Bicycle racers use the Town of Eureka for overnight stays.

In addition to the many available outdoor recreation opportunities available in southern Eureka County, Eureka County and the Eureka County School District (ECSD) provide a number of developed recreation facilities. The county provides a park in Eureka, which offers barbecue facilities, covered picnic tables, horseshoe pits and a children's playground. The county also provides two baseball diamonds and an indoor swimming pool in Eureka. The school district allows community use of an indoor gymnasium, football field, and a running track when these facilities are not being used for school events.

The Eureka County **Fairgrounds**, located on the **north end** of Eureka, provides a pavilion with a stage, a fair building, restrooms, concession stand, and large and small arenas (Eureka County 1996). This facility hosts events such as the county fair, the county youth fair, the high school rodeo, and a series of horse shows, softball tournaments, bicycle races and shooting and archery tournaments (Eureka County Economic Development Council 2006).

Of importance to the local community and visitors are Roberts Creek, Pete Hanson Creek, and Tonkin Reservoir, which are important parts of the recreational portfolio. These areas have been used as traditional and historic fishing areas for the residents of Eureka County and others, and provide important water-based recreational and fishing opportunities in areas within close proximity to residents.

3.15.2.2.2 Wilderness Study Areas

Roberts Mountain WSA

The Roberts Mountain WSA is located in the Roberts Mountains approximately 40 miles northwest of Eureka, Nevada (Figure 3.15.1). The WSA includes 15,090 acres of public land with no privately owned inholdings. The Roberts Mountain WSA is irregularly shaped and surrounded on the three sides by major valley systems. The WSA consists of rugged mountainous areas and contains three prominent peaks. The varied topography has led to a variety of vegetative communities in proximity to one another. Vegetation consists of willow, cottonwood, aspen, birch, and dogwood trees in the deep narrow canyons. Mountain mahogany trees and limber pine are found in isolated stands on the barren rock ridges. **The BLM recommends zero acres as suitable for wilderness designation.**

The Roberts Mountains are the type locality (the geologic point of first recognition for example) of the Roberts Mountains Thrust, which is a major geologic structure in western North America. The area has been referred to as "the Window of the World" because of the unique view it gives of the complex geologic structure of the region and has been studied by professional geologists and students from across the nation because of its rare qualities and geologic importance.

Simpson Park WSA

The Simpson Park WSA is located in the Simpson Park Mountain Range approximately 50 miles northwest of Eureka, Nevada. The WSA includes 49,670 acres of public land and surrounds two privately owned inholdings totaling 80 acres. The Simpson Park WSA consists of mountainous topography with scattered stands of aspen and mountain mahogany. The WSA is approximately 17 miles long and five miles wide. No special features of geological, ecological, scientific, educational, scenic, or historical value are known to exist in the Simpson Park WSA. **The BLM recommends zero acres as suitable for wilderness designation.**

3.15.3 Environmental Consequences and Mitigation Measures

3.15.3.1 Significance Criteria

The Proposed Action or alternatives would be considered to have a significant effect on the environment if the following would occur:

- Conflict with formally established recreational, educational, religious, or scientific uses of the area;
- Result in nonconformance with the Wilderness Act of 1964 or the BLM Interim Management Policy for Lands Under Wilderness Review;
- Substantially degrade or reduce the quantity or quality of the area available for existing or future recreational opportunities; or

- Result in the unmitigated loss of a unique recreational resource.

3.15.3.2 Assessment Methodology

The Proposed Action and alternatives were compared to the recreational planning information obtained from Eureka County, NDSP, and BLM to determine the potential for, and expected severity of, conflicts with existing and planned recreational uses. Potential effects on recreational resources can be categorized as short term (i.e., during the life of the Project) and long term. Short-term loss of recreation would occur in areas subject to surface disturbance and subsequent reclamation. Long-term loss of recreation would occur in areas that would not be reclaimed. The effects are determined to be significant or not significant based on the applicable significance criteria listed in Section 3.15.3.1.

3.15.3.3 Proposed Action

3.15.3.3.1 Short-Term Recreational Opportunities

Implementation of the Proposed Action would directly affect recreation through loss of public lands managed for multiple uses, including dispersed recreation, for the duration of the Project including reclamation (approximately 70 years) within the fenced portion of the Project Area. The portion of the Project Area that would not be accessible to the public, the 14,204 fenced acres that includes the main portion of the Project Area (open pit, WRDF, and TSFs) and the well heads and booster stations, is similar to the surrounding region and does not provide unique recreational opportunities for the area. This area would be reopened to the public as soon as the mine poses no safety risk following reclamation. The restoration of recreational opportunities within the Project Area would depend on the successful reclamation of the land. Large areas of open land outside the Project Area, but within the BLM's MLFO, are available for dispersed recreation. In a portion of central Nevada where most of the surrounding lands are open public lands, the fencing and restricted public use of the Project Area would not greatly limit recreational opportunities. However, those individuals that currently use the Project Area for recreational activities or hunting would be required to use other areas over the life of the Project.

■ **Impact 3.15.3.3-1:** Public lands within the fenced portion of the Project Area (14,204 acres) potentially used for dispersed recreation would be removed from use in the short term as a result of the construction and operation of the Project.

Significance of the Impact: The impact does not meet the significance criteria listed in Section 3.15.3.1.

No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.15.3.3.2 Long-Term Recreational Opportunities

Under the Proposed Action, 734 acres of the Project Area would be restricted from recreation in the long term for safety and security reasons through the installation of the berms and fencing. This area corresponds to the open pit.

- **Impact 3.15.3.3-2:** A total of 734 acres within the Project Area would be closed to public access and users in the long term.

  Significance of the Impact: The impact does not meet the significance criteria listed in Section 3.15.3.1.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.15.3.3.3 Regional Recreation Effects

The Proposed Action would result in an increased population in the local region and associated increase in demand for recreational opportunities. Dispersed and developed recreation areas would be impacted by increased use and demand.

- **Impact 3.15.3.3-3:** Public lands, developed recreation sites, and community recreation facilities would be impacted by increased use and demand.

  Significance of the Impact: The impact does not meet the significance criteria listed in Section 3.15.3.1.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.15.3.3.4 Wilderness Study Area Effects

The Proposed Action would have no direct impact on wilderness areas or WSAs. The Proposed Action conforms with the Wilderness Act of 1964 and the BLM's IMP for WSAs.

3.15.3.3.5 Indirect Effects

Potential indirect impacts to recreation could occur if ground water pumping activities decrease the flows in Roberts Creek. Decreased flows could limit fishing opportunities and the overall quality of the area for camping and general recreational activities. Other indirect impacts to recreation associated with the Proposed Action may result due to impacts to vegetation, wildlife, or visual resources. Potential impacts to these resources are analyzed in Sections 3.9, 3.24, and 3.7, respectively. Potential impacts and associated mitigation to flows in Roberts Creek are outlined in Section 3.2.

3.15.3.3.6 Residual Adverse Impacts

The Proposed Action would result in the unavoidable loss of up to 14,204 acres in the short term and an unavoidable and adverse loss of 734 acres in the long term of public land managed for multiple uses, including dispersed recreation, resulting from surface disturbance, and access to surrounding recreation areas would be restricted through a portion of the Project Area. As a result of the increased population in the area, there would be an increased demand for recreational areas and facilities; however, due to the proximity of similar public lands, the unavoidable potential impacts are considered less than significant. There would be no residual adverse impacts on wilderness or WSAs.

3.15.3.4 No Action Alternative

3.15.3.4.1 Short-Term Recreational Opportunities

Under the No Action Alternative, the proposed Project would not be developed and associated impacts to recreation would not occur; however, EML would continue to conduct mineral exploration and data acquisition within the Project Area. Ongoing reclamation would help to minimize impacts to recreation as a result of these activities. The area would remain available for future mineral development, recreational use, or for other purposes as approved by the BLM.

- **Impact 3.15.3.4-1:** Public lands potentially used for dispersed recreation adjacent to the mineral exploration and data acquisition areas would be removed from use for the duration of those activities.

  Significance of the Impact: The impact does not meet the significance criteria listed in Section 3.15.3.1.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.15.3.4.2 Residual Adverse Impacts

The No Action Alternative would result in the unavoidable loss of public land managed for multiple uses, including dispersed recreation, resulting from surface disturbance; however, the loss of recreational areas under this alternative would be minimal. There would be no residual adverse impacts on wilderness or WSAs.

3.15.3.5 Partial Backfill Alternative

3.15.3.5.1 Short-Term Recreational Opportunities

The Partial Backfill Alternative would involve the partial backfilling of the open pit to eliminate the pit lake and the floor of the open pit would be reclaimed with growth media and seeded. Although the Proposed Action would have 734 acres that would remain unvegetated in the open pit, under this alternative approximately 206 acres associated with the remaining open pit highwalls would remain unvegetated following Project completion and reclamation; however, impacts to recreation from this alternative would be the same as the Proposed Action since the fenced area around the Project would be the same.

- **Impact 3.15.3.5-1:** Public lands within the fenced portion of the Project Area (14,204 acres) potentially used for dispersed recreation would be removed from use in the short term as a result of the construction and operation of the Project.

  Significance of the Impact: The impact does not meet the significance criteria listed in Section 3.15.3.1.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.15.3.5.2 Long-Term Recreational Opportunities

Even though the open pit would be partially backfilled and the pit floor revegetated, the 734 acres of the open pit would be restricted from recreation in the long term for safety and security reasons, which is the same as under the Proposed Action.

- **Impact 3.15.3.5-2:** A total of 734 acres within the Project Area would be closed to public access and users in the long term through the installation of the berms and fencing.

  Significance of the Impact: The impact does not meet the significance criteria listed in Section 3.15.3.1.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.15.3.5.3 Regional Recreation Effects

The Partial Backfill Alternative would result in an increased population in the local region and associated increase in demand for recreational opportunities. Dispersed and developed recreation areas would be impacted by increased use and demand.

- **Impact 3.15.3.5-3:** Public lands, developed recreation sites, and community recreation facilities would be impacted by increased use and demand.

  Significance of the Impact: The impact does not meet the significance criteria listed in Section 3.15.3.1.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.15.3.5.4 Wilderness Study Area Effects

The Partial Backfill Alternative would have no direct impact on wilderness areas or WSAs. The Proposed Action conforms with the Wilderness Act of 1964 and the BLM's IMP for WSAs.

3.15.3.5.5 Indirect Effects

Potential indirect impacts to recreation could occur if ground water pumping activities decrease the flows in Roberts Creek. Decreased flows could limit fishing opportunities and the overall quality of the area for camping and general recreational activities. Indirect impacts to recreation associated with the Partial Backfill Alternative may result due to impacts to vegetation, wildlife, or visual resources. Potential impacts to these resources are analyzed in Sections 3.9, 3.24, and 3.7, respectively.

3.15.3.5.6 Residual Adverse Impacts

The Partial Backfill Alternative would result in the unavoidable loss of up to 14,204 acres in the short term and an unavoidable and adverse loss of 734 acres in the long term of public land managed for multiple uses, including dispersed recreation, resulting from surface disturbance,

and access to surrounding recreation areas would be restricted through a portion of the Project Area. There would be an increased demand for recreational areas and facilities; however, due to the proximity of similar public lands, the unavoidable potential impacts are considered less than significant. There would be no residual adverse impacts on wilderness or WSAs.

3.15.3.6 Off-Site Transfer of Ore Concentrate for Processing Alternative

3.15.3.6.1 Short-Term Recreational Opportunities

Although the Off-Site Transfer of Ore Concentrate for Processing Alternative would result in approximately 20 acres less surface disturbance compared to the Proposed Action, impacts to recreation from this alternative would be the same as the Proposed Action since the fenced area of the Project would be the same.

- **Impact 3.15.3.6-1:** Public lands within the fenced portion of the Project Area (14,204 acres) potentially used for dispersed recreation would be removed from use in the short term as a result of the construction and operation of the Project.

  Significance of the Impact: The impact does not meet the significance criteria listed in Section 3.15.3.1.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.15.3.6.2 Long-Term Recreational Opportunities

Under the Off-Site Transfer of Ore Concentrate for Processing Alternative, 734 acres of the Project Area would be restricted from recreation in the long term for safety and security reasons. This area corresponds to the open pit.

- **Impact 3.15.3.6-2:** A total of 734 acres within the Project Area would be closed to public access and users in the long term through the installation of the berms and fencing.

  Significance of the Impact: The impact does not meet the significance criteria listed in Section 3.15.3.1.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.15.3.6.3 Regional Recreation Effects

The Off-Site Transfer of Ore Concentrate for Processing Alternative would result in an increased population in the local region and associated increase in demand for recreational opportunities. Dispersed and developed recreation areas would be impacted by increased use and demand.

- **Impact 3.15.3.6-3:** Public lands, developed recreation sites, and community recreation facilities would be impacted by increased use and demand.

Significance of the Impact: The impact does not meet the significance criteria listed in Section 3.15.3.1.

No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.15.3.6.4 Wilderness Study Area Effects

The Off-Site Transfer of Ore Concentrate for Processing Alternative would have no direct impact on wilderness areas or WSAs. The Proposed Action conforms with the Wilderness Act of 1964 and the BLM's IMP for WSAs.

3.15.3.6.5 Indirect Effects

Potential indirect impacts to recreation could occur if ground water pumping activities decrease the flows in Roberts Creek. Decreased flows could limit fishing opportunities and the overall quality of the area for camping and general recreational activities. Indirect impacts to recreation associated with the Off-Site Transfer of Ore Concentrate for Processing Alternative may result due to impacts to vegetation, wildlife, or visual resources. Potential impacts to these resources are analyzed in Sections 3.9, 3.24, and 3.7, respectively.

3.15.3.6.6 Residual Adverse Impacts

The Off-Site Transfer of Ore Concentrate for Processing Alternative would result in the unavoidable loss of up to 14,204 acres in the short-term and an unavoidable and adverse loss of 734 acres in the long-term of public land managed for multiple uses, including dispersed recreation, resulting from surface disturbance, and access to surrounding recreation areas would be restricted through a portion of the Project Area. There would be an increased demand for recreational areas and facilities; however, due to the proximity of similar public lands, the unavoidable potential impacts are considered less than significant. There would be no residual adverse impacts on wilderness or WSAs.

3.15.3.7 Slower, Longer Project Alternative

Impacts to recreation from the Slower, Longer Project Alternative are expected to be similar to impacts from the Proposed Action at the end of the Project; however, impacts from the Slower, Longer Project Alternative would occur over a period approximately twice as long in duration compared to the Proposed Action.

3.15.3.7.1 Short-Term Recreational Opportunities

- **Impact 3.15.3.7-1:** Public lands within the fenced portion of the Project Area (14,204 acres) potentially used for dispersed recreation would be removed from use in the short-term as a result of the construction and operation of the Project.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.15.3.7.2 Long-Term Recreational Opportunities

Under the Slower, Longer Project Alternative, 734 acres of the Project Area would be restricted from recreation in the long-term for safety and security reasons. This area corresponds to the open pit.

- **Impact 3.15.3.7-2:** A total of 734 acres within the Project Area would be closed to public access and users in the long-term.

  Significance of the Impact: The impact does not meet the significance criteria listed in Section 3.15.3.1.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.15.3.7.3 Regional Recreation Effects

The Slower, Longer Project Alternative would result in an increased population in the local region and associated increase in demand for recreational opportunities. Dispersed and developed recreation areas would be impacted by increased use and demand.

- **Impact 3.15.3.7-3:** Public lands, developed recreation sites, and community recreation facilities would be impacted by increased use and demand.

  Significance of the Impact: The impact does not meet the significance criteria listed in Section 3.15.3.1.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.15.3.7.4 Wilderness Study Area Effects

The Slower, Longer Project Alternative would have no direct impact on wilderness areas or WSAs. The Slower, Longer Project Alternative conforms with the Wilderness Act of 1964 and the BLM's IMP for WSAs.

3.15.3.7.5 Indirect Effects

Potential indirect impacts to recreation could occur if ground water pumping activities decrease the flows in Roberts Creek. Decreased flows could limit fishing opportunities and the overall quality of the area for camping and general recreational activities. Indirect impacts to recreation associated with the Slower, Longer Project Alternative may result due to impacts to vegetation, wildlife, or visual resources. Potential impacts to these resources are analyzed in Sections 3.9, 3.24, and 3.7, respectively.

3.15.3.7.6 Residual Adverse Impacts

The Slower, Longer Project Alternative would result in the unavoidable loss of up to 14,204 acres in the short-term and an unavoidable and adverse loss of 734 acres in the long-term

of public land managed for multiple uses, including dispersed recreation, resulting from surface disturbance, and access to surrounding recreation areas would be restricted through a portion of the Project Area. There would be an increased demand for recreational areas and facilities; however, due to the proximity of similar public lands, the unavoidable potential impacts are considered less than significant. There would be no residual adverse impacts on wilderness or WSAs.

3.16 Auditory Resources

3.16.1 Regulatory Framework

The State of Nevada and Eureka County do not have auditory resources criteria or standards for evaluating auditory resource impacts associated with mining operations; therefore, auditory resource impacts would be evaluated in this document according to the estimated degree of disturbance to the nearest sensitive receptor sites. The BLM and the NPS do not have auditory criteria or standards.

3.16.2 Affected Environment

This section explains the terminology used to describe sound levels and auditory resources, as well as the existing noise conditions at selected locations near the Project. Hearing a sound occurs when rapid variations in air pressure are stimulating or moving the ear drum (tympanic membrane), and this mechanical movement, in turn, stimulates various components of the peripheral and central auditory system. Noise is a sound which is unwanted or not desired and which may disrupt human activities **and wildlife**. Air pressure variations are measured as the change in sound pressure exerted on the diaphragm of a microphone attached to a sound level meter.

Sound is measured in units of decibels (dB) and for environmental purposes usually is measured in units of decibels A-weighted (dBA). A-weighting refers to an electronic technique which simulates the relative response of the human auditory system to the various frequencies comprising all sounds. The sound levels are described in units of dBA, unless stated otherwise. The sound measurement scale is not linear, it is logarithmic. A logarithmic scale is used because sound levels can span over a very large range and the logarithmic scale permits use of relatively small numbers. For example, sound pressures of approximately 115 dBA are not uncommon in nightclubs or near loudspeakers at rock concerts. A sound pressure at 115 dBA is equal to 10,000,000 micropascals. In contrast, zero dBA is the threshold of human hearing, which is equivalent to 20 micropascals. Thus, a range of approximately ten million pressure units can be described with only 115 dB units. This range is specific to this example, but sound pressure levels of 140 dBA and above have been recorded near rocket engines.

Logarithmic scales cannot be added arithmetically. For example, one sound at 80 dB plus another sound at 80 dB would not equal 160 dB. The combined 80 dB sounds would result in a total sound level of approximately 83 dB because sound is measured on a logarithmic scale. The combined total sound level from two sources is only 40.3 dBA if one sound is at 40 dBA and the second sound is at 29 dBA. The following are rules that may be helpful in understanding this analysis:

- In general, one sound must be at least three dB louder than another sound for people to reliably determine that one sound source is louder than a second source; and
- A sound that is approximately ten dB louder than a second sound would be perceived as being about twice as loud as the second sound.

Federal recommendations for acceptable noise levels at residential receivers are generally in the range of 55 dB L_{dn} to 65 dB L_{dn} (L_{dn} = level day/night), based upon the recommendations contained in the EPA "Levels Document" (1974) and upon the 65 dB L_{dn} criterion applied by the U.S. Department of Housing and Urban Development and other federal agencies. These criteria are typically applied to noise from transportation noise sources, but may be used to assess the compatibility of other noise sources relative to residential land uses, provided that consideration is given to potential disturbances due to impulsive sound, tonal content (whistles, music, etc.), and the prevalence of nighttime activities.

For other noise sources, especially those that may occur over short periods of the day or night, it is common to apply noise criteria based upon hourly noise levels, making a distinction between noise levels produced during daytime and nighttime hours. Acceptable hourly noise levels in residential areas are usually considered to be in the range of 50 to 55 dB (average) during daytime hours and 45 to 50 dB (average) during nighttime hours; the lower noise level limits would be appropriate in areas that currently have low ambient noise levels. Hourly noise standards are usually expressed in terms of average (L_{eq}) or median (L_{50}) noise levels, and they often are corrected for the presence of impulsive sounds and tonal content.

Table 3.16-1 shows the approximate sound levels associated with various common sources. Note that the range of sound levels is 75 dBA (from 25 to 100 dBA) and ranges between the very quiet (rustling leaves) to a loud auto horn. The measured sound level decreases with increasing distance between a sound source and the sound-measuring device or the listener. Distances are specified for some sources in Table 3.16-1.

Table 3.16-1: Relative Scale of Various Noise Sources

Noise Level (dBA)[a]	Common Indoor Noise Levels	Common Outdoor Noise Levels
110	Rock band	--
105	--	Jet flyover at 1,000 feet
100	Inside New York subway train	--
95	--	Gas lawn mower at 3 feet
90	Food blender at 3 feet	--
80	Garbage disposal at 3 feet, or shouting at 3 feet	Noisy urban daytime
70	Vacuum cleaner at 10 feet	Gas lawn mower at 100 feet
65	Normal speech at 3 feet	Commercial area, heavy traffic at 300 feet
60	Large business office	--
50	Dishwasher in next room	Quiet urban daytime
40	Small theater, large conference room	Quiet urban nighttime
35	--	Quiet suburban nighttime
33	Library	--

Noise Level (dBA)[a]	Common Indoor Noise Levels	Common Outdoor Noise Levels
28	Bedroom at night	--
25	Concert hall (background)	Quiet rural nighttime
15	Broadcast and recording studio	--
5	Threshold of hearing	--

[a] A-weighted decibel sound scale.

At relatively high levels, noise can be a nuisance because it may interfere with daytime activities such as hearing and understanding speech, it may disrupt sleep, or more generally degrade the quality of life; however, there is no simple answer to the question of "how much noise is too much?" In part, the answer depends on the loudness of the noise relative to ambient or background noise level, when it occurs, what the listener is doing, what the noise source is, and the listener's attitude toward the source. Nonetheless, some reasonably accurate estimates of how communities of people may respond to noise can be made based on measurements and predictions of the A-weighted noise levels expected at some locations. These estimates are based on a fairly large number of scientific studies of community responses to noise at many average noise levels from a wide variety of noise sources (Harris 1991; Kryter 1985; and May 1978). The studies and empirically validated techniques for estimating (predicting) noise levels at receptors (Edison Electric Institute 1984) are used in predicting and evaluating noise effects on humans.

3.16.2.1 Study Methods

The Project noise impact analysis for the Project applied measured noise levels and frequency content of representative noise sources to the Environmental Noise Model (ENM). The ENM is a commercially-available noise propagation model that accepts input of noise levels and frequency content for a number of sources, located on an appropriate base map. In this case, a generalized model was used that assumed a level ground situation, and thus the modeling did not account for topography in the Project Area which results in a more conservative analysis. The ENM predicts noise propagation in terms of noise levels at selected receivers, or in terms of noise contours, accounting for the effects of atmospheric and ground absorption of sound.

Noise level data for the sources expected to be used at the Project were obtained from noise measurements conducted by Brown-Buntin Associates, Inc. (BBA) at aggregate and asphalt plants in California and Nevada.

The equipment used for most of the noise measurements was a Larson Davis Model 824 precision integrating sound level meter and frequency analyzer fitted with a Larson Davis Model 2541 free-field microphone, meeting the specifications of the American National Standards Institute (ANSI) for Type 1 sound measurement systems. The noise measurement system was calibrated before use with a Larson Davis Model CA-250 acoustical calibrator certified by its manufacturer to be consistent with reference values maintained by the National Bureau of Standards.

To prepare the data for use in the ENM, the measured noise levels were entered into the ENM in terms of octave band sound pressure levels, referring to the measurement distance. The ENM was then calibrated for each source to predict the same values as were measured in the field. For most noise sources, the data were entered as hourly equivalent noise levels (L_{eq}). For sound sources that were not continuous in nature, such as passing trucks, the data were entered as

Sound Exposure levels (SEL), and adjustments were made to derive the L_{eq} based upon the projected numbers of operations per hour at the Project.

The noise sources were placed on the ENM base map at representative heights above the ground surface, based upon the equipment observed at similar project sites. The receiver sites selected for this analysis generally describe the nearest residential areas or sites of potential concern. Ambient noise levels were assigned to each site based upon the noise measurement results obtained at the nearest ambient noise monitoring sites. This method allows comparison of predicted Project-related and representative ambient noise levels.

The ENM accounts for atmospheric absorption of sound, considering the factors of temperature, relative humidity, and absorption of sound by the ground. The noise level predictions made for this Project assume a uniform atmosphere with no wind. It is recognized that variations in atmospheric conditions may cause the actual Project noise levels to be either higher or lower than predicted by the ENM.

The effects of changes in temperature and humidity upon sound propagation are generally slight, so that variations in predicted noise levels within the range of temperature and relative humidity found in the Project Area would not be substantial.

Winds can affect sound propagation, generally by increasing noise levels downwind, and decreasing noise levels upwind; however, wind effects are difficult to predict reliably, as the range of wind speeds and directions experienced during even one night can be quite broad.

In the noise modeling process, the mining noise sources (power shovel, bulldozers, excavator, trucks and loaders) were placed in the approximate center of the assumed mining area. The processing equipment was placed on the base map as shown by the operations plan. The modeling assumed a flat earth scenario, where all equipment was placed at appropriate heights above the existing grade, and where no topographic shielding (by topography or excavations) was present.

It is recognized that the mining equipment may be placed at any point in the mining area, and would therefore be either closer to, or farther from, any given sensitive receiver location at different times during the mine development. As a result, the predicted noise levels would increase or decrease as a function of distance. Similarly, the equipment may be placed closer to, or farther from, the sides of the excavation, which would either enhance or reduce the insertion loss (shielding) and consequent noise level reduction provided by topographic barriers. Preparation of detailed noise models for all possible configurations of mining is clearly impractical.

The noise modeling assumptions provide a generalized depiction of mining and milling facility noise levels, based upon the available source noise emission data. The modeled noise levels provide a conservative basis for judging the likely noise impacts of this Project.

In addition to the analysis using the ENM, there are qualitative issues related to auditory effects. These include the consistency and duration of the noise.

The closest noise-sensitive receptors where noise from the existing and proposed operations is or could be heard are assessed in this section. These receptors include the following:

- Alpha Ranch;
- Roberts Creek Ranch;
- Risi Ranch; **and**
- Diamond Valley residences.

3.16.2.2 Existing Conditions

Ambient noise levels were collected at the Alpha and Roberts Creek Ranches and the results are listed in Table 3.16-2. The ambient noise levels were very low at 20 and 21 dB, respectively. The noise levels are typical of isolated desert areas. Other locations, such as the Risi Ranch or the Diamond Valley residences which are a similar distance from the Project Area would likely have similar or higher ambient noise levels due to the traffic traversing SR 278, U.S. Highway 50, and other roads in the area.

Table 3.16-2: Bases for Ambient Hourly Noise Level Assumptions

Receiver	Description	Ambient L_{50}, dB	Date of Ambient Measurements	Time Period
1	Alpha Ranch	21	September 10, 2007	0800-1200
2	Roberts Creek Ranch	20	September 11, 2007	0800-1200

3.16.3 Environmental Consequences and Mitigation Measures

3.16.3.1 Significance Criteria

Noise impacts from mining would be considered significant if the Proposed Action would result in noise levels in excess of 55 dBA, as measured outside the Project Area at a sensitive receptor site. Noise impacts from blasting would be considered significant if the Proposed Action resulted in the following:

- Maximum noise levels in excess of 70 dBA measured at a sensitive receptor site;
- Ground vibration as a result of blasting that could initiate or extend observable cosmetic cracking of structures at a sensitive receptor site;
- **Flyrock from blasting results in property damage or human injury outside the Project fence;** or
- A substantial temporary or periodic increase in ambient noise levels in the Project vicinity above levels existing without the Project.

3.16.3.2 Assessment Methodology

Noise impacts were evaluated according to the estimated degree of disturbance to the nearest sensitive receptor sites. **Impacts to wildlife are discussed in Section 3.23.3.**

3.16.3.3 Proposed Action

Noise levels associated with the Project would be related to mining and construction operations and blasting activities. The ENM was run to predict hourly noise levels assuming that the mining and processing equipment was in continuous use.

The ambient noise level data for Alpha and Roberts Creek Ranches listed in Table 3.16-2 were carefully reviewed to select conservative bases for comparison to the relatively steady-state noise

levels produced by the proposed mining operation (as perceived at a distance). For this purpose, the "ambient noise level" was assumed to be represented by the measured hourly median noise levels (L_{50}) at the quietest part of the day.

The assumed ambient noise level was the arithmetic average of the hourly median noise levels of the quietest contiguous four-hour period of the quietest day. This describes the noise level experienced during the quietest time of the day. Table 3.16-3 lists the measurement locations and time periods used to establish the "quiet hours" ambient noise levels for the noise impact analysis, and the dominant noise sources at each location.

Table 3.16-3 lists the predicted average Project-related noise levels at each of the selected noise receptor monitoring location, and provides a comparison to the measured ambient hourly noise levels described by Table 3.16-2.

For assessment of noise levels in terms of the L_{dn}, it was necessary to make certain assumptions about the hours of operation for the Project. For this analysis, it was assumed that the Project would be in operation 24 hours on any given day. Given this assumption, the L_{dn} values would be 6.4 dB higher than the L_{eq} values shown by Table 3.16-3. Similarly, 6.4 dB should be added to the L_{eq} noise contours, so that, for example, the 45 dB L_{eq} contour represents 51.4 dB L_{dn}.

Table 3.16-3: Comparison of Predicted and Ambient Hourly Noise Levels

Receiver	Description	Project L_{eq}, dB	Ambient L_{50}, dB	Project + Ambient, dB	Change, dB
1	Alpha Ranch	<10	21	21	0
2	Roberts Creek Ranch	13	20	21	1

The ambient L_{dn} value was the energy-average of the daily L_{dn} values observed during the continuous noise measurement periods. Table 3.16-4 lists the predicted L_{dn} values for the Project operations and provides a comparison to the average measured ambient L_{dn} values.

Table 3.16-4: Comparison of Predicted and Ambient Day-Night Levels

Receiver	Description	Project L_{eq}, dB	Ambient L_{50}, dB	Project + Ambient, dB	Change, dB
1	Alpha Ranch	16	43.8	43.8	0
2	Roberts Creek Ranch	19	43.7	45.7	2

3.16.3.3.1 Noise Associated with the Water System Booster Station

The water for the mine would be pumped from wells using submersible pumps, which are typically inaudible at the ground surface. The water would then be pumped to the mine site using a booster station, which would have four 600-**Horsepower (**Hp**)** pump motors. These pumps would be above ground. Based upon accepted engineering methods, the noise level of a single pump would be about 96 dBA at a distance of three feet. A group of four pumps could produce a noise level as high as 55 dBA at a distance of 2,000 feet and 40 dBA at a distance of 3,000 feet. The booster pump station would be located at the north end of the Kobeh Valley, greater than 2,000 and 5,000 feet from the nearest sensitive receptors, greater sage-grouse leks and Roberts Creek Ranch, respectively (Figure 2.1.7).

3.16.3.3.2 Traffic Noise

Traffic noise from SR 278 is an existing noise source in the Project Area. Noise levels due to Project-related traffic on SR 278 were predicted using the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA-RD-77-108).

For the traffic noise impact analysis, it was assumed that a representative noise exposure would occur at a reference distance of 50 feet from the centerline of SR 278, which roughly corresponds to the nearest possible residential receivers. The ADT volume for year 2006 with the addition of construction traffic is predicted to be 313 vehicles north of the Project Area and 797 vehicles south of the Project Area. Assuming normal mining operations, the ADT volume is predicted to be 316 vehicles north of the Project Area and 700 vehicles south of the Project Area. Truck mix was adjusted to match the predicted ADT volumes for heavy trucks during construction and operational conditions. Day-night distribution of traffic noise was again assumed to be 87 percent (day) and 13 percent (night). Average vehicle speed was assumed to be 65 mph.

Table 3.16-5 lists the traffic noise modeling results for the year 2006 with the Project during construction and operational phases in terms of the L_{dn}. Table 3.16-6 shows reference noise emission levels and usage factors for construction equipment.

Table 3.16-5: State Route 278 Traffic Noise Levels Project Conditions

Positions Relative to Project Area	Predicted L_{dn}, dB, at 50 feet from Centerline				Distances from Centerline to L_{dn} Contours, feet		
	Autos	Medium Trucks	Heavy Trucks	Total	60 dB	65dB	70dB
Construction Phase							
North	54.5	51.5	53.4	58.1	37	17	8
South	58.7	55.5	56.0	61.7	65	30	14
Operations Phase							
North	54.1	52.3	56.1	59.2	44	21	10
South	58.1	54.5	56.2	61.3	61	28	13

Table 3.16-6: Reference Noise Emission Levels and Usage Factors for Construction Equipment

Equipment Description	Impact Device ?	Typical Use Factor %	Predicted L_{max} @ 50 ft (dBA, slow)	Average Measured L_{max} @ 50 ft (dBA, slow)	No. of Data Samples
All Other Equipment> 5 H**p**	No	50	85	- - NA - -	0
Auger Drill Rig	No	20	85	84	36
Backhoe	No	40	80	78	372
Boring Jack Power Unit	No	50	80	83	1
Compactor (ground)	No	20	80	83	57
Compressor (air)	No	40	80	78	18
Concrete Mixer Truck	No	40	85	79	40

Equipment Description	Impact Device ?	Typical Use Factor %	Predicted L_{max} @ 50 ft (dBA, slow)	Average Measured L_{max} @ 50 ft (dBA, slow)	No. of Data Samples
Concrete Pump Truck	No	20	82	81	30
Concrete Saw	No	20	90	90	55
Crane	No	16	85	81	405
Dozer	No	40	85	82	55
Drill Rig Truck	No	20	84	79	22
Dump Truck	No	40	84	76	31
Excavator	No	40	85	81	170
Flat Bed Truck	No	40	84	74	4
Front End Loader	No	40	80	79	96
Generator	No	50	82	81	19
Generator (<25K**ilo** V**olt** A**mperes**, VMS signs)	No	50	70	73	74
Gradall	No	40	85	83	70
Grader 19	No	40	85	- - NA - -	0
Horizontal Boring Hydraulic Jack	No	25	80	82	6
Jackhammer	Yes	20	85	89	133
Mounted Impact Hammer (hoe ram)	Yes	20	90	90	212
Pavement Scarifier	No	20	85	90	2
Paver	No	50	85	77	9
Pickup Truck	No	40	55	75	1
Pneumatic Tools	No	50	85	85	90
Roller	No	20	85	80	16
Sand Blasting (Single Nozzle)	No	20	85	96	9
Scraper	No	40	85	84	12
Tractor	No	40	84	- - NA - -	0
Ventilation Fan	No	100	85	79	13
Warning Horn	No	5	85	83	12
Welder / Torch	No	40	73	74	5

Source: FHWA Roadway Construction Noise Model, February 15, 2006

3.16.3.3.3 Construction Noise

Construction of the open pit and processing facilities would require use of a variety of engine-powered equipment on the site. Construction is expected to occur over a period of 18 to 20 months. In the first two months, it is anticipated that construction would occur on a 24-hour basis. The remaining construction would occur during daylight hours (7 a.m. to 6 p.m.), but could occur at night during the last four months of construction.

The noise levels associated with typical construction equipment are shown in Table 3.16-6. During the construction phase of the Project, noise from construction equipment would dominate the noise environment in the immediate area.

Maximum noise levels from different types of equipment under different operating conditions could range from 70 dB to 90 dB at a distance of 50 feet. The actual noise effects at any given

sensitive receiver location near the Project Area would be the result of a series of construction tasks. For example, bulldozers would rough out the roadway and building pads. Bulldozers and loaders would move the loose materials to haul trucks, which would either leave the site or transfer materials to areas needing fill. Scrapers and graders would level the site. Other equipment would deliver and install materials and utilities. Compressors and generators could be used at any time.

3.16.3.3.4 Blasting Noise

Blasting would be conducted to break up the rock for hauling and processing. Although blasts are perceived to be one large explosion, mining blasts are actually a series of smaller, single-hole explosions. Each hole is sequentially delayed and detonated independently of the other holes. Less noise and ground vibrations are generated because several small blasts (delays) are detonated in sequence rather than as one large instantaneous blast. Blasting can be further controlled by varying the amount of explosive, the type of delay, the delay sequence, and the type of explosives. In general, blasting is controlled to minimize dispersal of the rock fragments, and to ensure the safety of the workers. Blasting is also controlled to prevent damage to nearby structures, including any on-site construction trailers.

Airborne overpressures produced by blasting are typically measured in terms of the overall peak sound pressure level, without applying the A-weighting filter. The dominant frequencies of sound pressures associated with blasting lie in the low frequency range of 2 Hz to 25 Hz, and the acoustical energy is concentrated below approximately five Hz. Audible sound, in contrast, is usually assumed to begin at 20 Hz, ranging up to 20,000 Hz. People hear best at frequencies in the range of 1,000 Hz to 4,000 Hz, and people hear poorly at the low frequencies associated with blast overpressures.

The A-weighting adjustment factor for sound at 25 Hz (the upper limit of the dominant blast frequencies) is -44.7 dB. There are no published A-weighting correction factors below 12.5 Hz (where the A-weighting correction factor is -63.4 dB). These factors indicate that very high blast overpressures would be required to generate sound pressure levels that would be audible in an outdoor environment.

Assuming that the Project is designed so that a **designed maximum** blast would not exceed 0.01 psi, and that all the energy of a blast would be concentrated at 25 Hz, the highest possible peak A-weighted sound pressure level due to a blast at the property line would be 65 dB, and the maximum noise level would likely be in the range of 55 to 60 dB. The maximum sound pressure level is lower than the peak level because peak and maximum levels are measured differently.

Blasting noise levels are difficult to predict in terms of A-weighted sound pressure levels because of their frequency content and brief duration. No noise propagation models are known to exist to predict the audible noise due to blasting; the ENM does not predict sound propagation for frequencies below 25 Hz.

Blasting takes place only during daylight hours and is conducted under strict MSHA safety procedures. As the open pit increases in depth, the noise from blasting is increasingly reflected upward by the open pit walls, thus further reducing the noise level.

- **Impact 3.16.3.3-1:** Ambient noise levels associated with the Proposed Action could be increased and affect ambient noise levels at the nearest ranch houses and residences.

  Significance of the Impact: The predicted changes in hourly ambient noise levels at the nearest ranch houses are 1 dB or less. The impact would be similar at the residences in Diamond Valley because of the similar distances from the Project activities. This impact would be considered less than significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.16.3.3-2:** Project-related noise levels associated with the Proposed Action could be increased to noise levels that would be less than 55 dBA as measured at a sensitive receptor site.

  Significance of the Impact: The impact would be considered less than significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.16.3.3-3:** The Proposed Action would cause increases in traffic noise levels.

  Significance of the Impact: The predicted changes in traffic noise levels are less than 3 dB where the existing traffic noise level exceeds 60 dB L_{dn}; therefore, the predicted changes in traffic noise levels due to the Proposed Action would be less than significant. The predicted Project-related mining and processing noise level in the vicinity of the Project access road and SR 278 is approximately 39 dB L_{dn}. This level of noise would not cause a significant change in ambient noise levels at that location in terms of L_{dn}, since the existing traffic noise would be nearly 20 dB higher than the mining and processing noise level.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.16.3.3-4:** The Proposed Action would cause increases in noise levels that could impact local residences through construction activities or poorly maintained construction equipment. The maximum noise levels received at the nearest ranch house, which is approximately two miles away from the nearest areas where grading would occur, would be reduced by approximately 23 dB as compared to the values shown on Table 3.16-6, ignoring sound absorption or any shielding provided by topography; therefore, maximum construction noise levels at the nearest ranch house would be in the range of approximately 47 to 67 dB. In practice, considering the topography of the Project Area, much of the construction equipment would be shielded from view of the nearest ranch house by topography. In those cases, the construction noise levels would be further reduced by 5 to 10 dB or greater.

  Significance of the Impact: Noise levels produced by construction activities or poorly maintained construction equipment in the vicinity of the Roberts Creek Ranch house

could be significant if such activities occurred at nighttime or if the noise level exceeds 55 dB.

- **Mitigation Measure 3.16.3.3-4:** Construction in the vicinity of the Roberts Creek Ranch house and greater sage-grouse leks would be limited to daylight hours and **would be limited during lekking periods (see Appendix D, Attachment 3)**. Construction equipment used in the vicinity of residences would be fitted with the best available technology manufacturers' noise control equipment, including engine exhaust silencers and acoustical enclosures. Noise control equipment would be maintained in good working order. Implementation of this mitigation measure would result in a less than significant impact.

- **Effectiveness of Mitigation and Residual Effects:** The implementation of this mitigation measure would be effective at reducing the potential impact to less than significant by controlling the generation of the noise.

- **Impact 3.16.3.3-5:** Noise caused by blasting during construction and mining could cause annoyance if residents were startled by unexpected blasts, or if blasting overpressures caused rattling of residence windows. The Proposed Action would not otherwise impact auditory resources associated with blasting.

  Significance of the Impact: This impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Blasting would result in flyrock that could travel beyond the Project fence. The potential for this to occur would be minimized by proper blast design which would include the following: understanding the geology and material blasted; the appropriate development of a blast pattern; understanding the burden, depth, diameter, and angle of the blast holes; appropriate delay systems, powder factors, and pounds per delay; the type and amount of explosive material; and the type and amount of stemming.

- **Impact 3.16.3.3-6: The Proposed Action could generate flyrock. However, Project design would limit the potential for flyrock to travel beyond the Project fence.**

  Significance of the Impact: This impact would not be considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.16.3.3.5 Residual Adverse Impacts

There are no residual adverse impacts associated with the Proposed Action because noise would cease once the Project activities terminate.

3.16.3.4 No Action Alternative

Under the No Action Alternative, EML would not be authorized to develop the Mount Hope Project and mine the Mount Hope ore body as currently defined under the Proposed Action. The No Action Alternative would result from the BLM disallowing the activities proposed under the Plan (EML 2006); however, EML would be able to continue exploration activities as outlined in previously submitted Notices. Refer to Section 1.3 for a discussion of the existing Notice level activities. The area would remain available for future mineral development or for other purposes as approved by the BLM.

3.16.3.4.1 Noise Impacts

Under the No Action Alternative, none of the impacts associated with the Proposed Action would occur. Any noise generated by exploration activities under Notice-level activities would be below the level of significance.

3.16.3.4.2 Residual Adverse Impacts

Under the No Action Alternative there would be no residual adverse impacts.

3.16.3.5 Partial Backfill Alternative

Under this alternative, the Proposed Action would be developed and have the same surface disturbance footprint; however, at the end of the mining in the open pit, the open pit would be partially backfilled to eliminate the potential for a pit lake. The open pit would be backfilled to an elevation that varies from northwest to southeast across the open pit from approximately 7,300 to 6,850 feet amsl. The backfilling would commence in year 32 and be completed in approximately 13 years. The partial backfilling would be accomplished by the same fleet and personnel that completed the mining.

3.16.3.5.1 Noise Impacts

The noise related impacts under the Partial Backfill Alternative would be similar to that described for the Proposed Action, except that the duration of the mining related noise would last for 13 years longer. The Partial Backfill Alternative requires that a portion of the waste rock removed during mining be dumped back into the open pit to the point that would eliminate the potential for a pit lake. The equipment required for moving and dumping waste rock would remain on site longer than under the Proposed Action.

- **Impact 3.16.3.5-1:** Ambient noise levels associated with the Partial Backfill Alternative could be increased and affect ambient noise levels at the nearest ranch houses or residences.

  Significance of the Impact: The predicted changes in hourly ambient noise levels at the nearest ranch houses are 1 dB or less. The impact would be similar at the residences in Diamond Valley. This impact would be considered less than significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.16.3.5-2:** Project-related noise levels associated with the Partial Backfill Alternative could be increased to noise levels that are less than 55 dBA as measured at a sensitive receptor site.

  Significance of the Impact: The impact would be considered less than significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.16.3.5-3:** The Partial Backfill Alternative would cause increases in traffic noise levels.

  Significance of the Impact: The predicted changes in traffic noise levels are less than 3 dB where the existing traffic noise level exceeds 60 dB L_{dn}; therefore, the predicted changes in traffic noise levels due to the Partial Backfill Alternative would be less than significant. The predicted Project-related mining and processing noise level in the vicinity of the Project access road and SR 278 is approximately 39 dB L_{dn}. This level of noise would not cause a significant change in ambient noise levels at that location in terms of L_{dn}, since the existing traffic noise would be nearly 20 dB higher than the mining and processing noise level.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.16.3.5-4:** The Partial Backfill Alternative would cause increases in noise levels that could impact local residences through construction activities or poorly maintained construction equipment. The maximum noise levels received at the nearest ranch house, which is approximately two miles away from the nearest areas where grading would occur, would be reduced by approximately 23 dB as compared to the values shown on Table 3.16-6, ignoring sound absorption or any shielding provided by topography; therefore, maximum construction noise levels at the nearest ranch house would be in the range of approximately 47 to 67 dB. In practice, considering the topography of the Project Area, much of the construction equipment would be shielded from view of the nearest ranch house by topography. In those cases, the construction noise levels would be further reduced by five to 10 dB or greater.

  Significance of the Impact: Noise levels produced by construction activities or poorly maintained construction equipment in the vicinity of the Roberts Creek Ranch house could be significant if such activities occurred at nighttime or if the noise level exceeds 55 dB.

- **Mitigation Measure 3.16.3.5-4:** Construction in the vicinity of the Roberts Creek Ranch house or greater sage-grouse leks would be limited to daylight hours and **would be limited during lekking periods (see Appendix D, Attachment 3)**. Construction equipment used in the vicinity of residences would be fitted with the best available technology manufacturers' noise control equipment, including engine exhaust silencers and acoustical enclosures. Noise control equipment would be maintained in good working order.

- **Effectiveness of Mitigation and Residual Effects:** The implementation of this mitigation measure would be effective at reducing the potential impact to less than significant by controlling the generation of the noise.

- **Impact 3.16.3.5-5:** Noise caused by blasting during construction and mining could cause annoyance if residents were startled by unexpected blasts, or if blasting overpressures caused rattling of residence windows. The Partial Backfill Alternative would not otherwise impact auditory resources associated with blasting.

  Significance of the Impact: This impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.16.3.5-6: The Proposed Action could generate flyrock. However, Project design would limit the potential for flyrock to travel beyond the Project fence.**

  Significance of the Impact: This impact would not be considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.16.3.5.2 Residual Adverse Impacts

There are no residual adverse impacts associated with the Partial Backfill Alternative.

3.16.3.6 Off-Site Transfer of Ore Concentrate for Processing Alternative

Under this alternative, the open pit, WRDFs, and TSFs would be developed as outlined under the Proposed Action; however, the ore processing facilities would include only the milling operations and production of the molybdenum sulfide concentrate. The TMO and FeMo portions of the processing facility would not be constructed, and as a result, the surface disturbance footprint would be approximately 20 acres less than under the Proposed Action. In addition, the leaching of the concentrate would likely not be done on site. The production of molybdenum sulfide concentrate would occur at an average rate of approximately 45.8 million pounds per year. This material would be stored at the Project Area in a concentrate storage structure adjacent to the mill. The molybdenum sulfide concentrate would be loaded from this storage facility into street-legal haul trucks with covered containers and transported on the public transportation system to either an existing or new TMO facility.

3.16.3.6.1 Noise Impacts

The noise related impacts under the Off-Site Transfer of Ore Concentrate for Processing Alternative would be similar to but less than the Proposed Action. There would be less noise from the processing facilities because of the elimination of the roaster portion of the process; however, all the other noise levels would be the same since there would be a similar number of trucks hauling ore concentrate under this alternative, versus trucks hauling TMO under the Proposed Action.

- **Impact 3.16.3.6-1:** Ambient noise levels associated with the Off-Site Transfer of Ore Concentrate for Processing Alternative could be increased and affect ambient noise levels at the nearest ranch houses or residences.

  Significance of the Impact: The predicted changes in hourly ambient noise levels at the nearest ranch houses are 1 dB or less. The impact would be similar at the residences in Diamond Valley. This impact would be considered less than significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.16.3.6-2:** Project-related noise levels associated with the Off-Site Transfer of Ore Concentrate for Processing Alternative could be increased to noise levels to less than 55 dBA as measured at a sensitive receptor site.

  Significance of the Impact: The impact would be considered less than significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.16.3.6-3:** The Off-Site Transfer of Ore Concentrate for Processing Alternative would cause increases in traffic noise levels.

  Significance of the Impact: The predicted changes in traffic noise levels are less than 3 dB where the existing traffic noise level exceeds 60 dB L_{dn}; therefore, the predicted changes in traffic noise levels due to the Off-Site Transfer of Ore Concentrate for Processing Alternative would be less than significant. The predicted Project-related mining and processing noise level in the vicinity of the Project access road and SR 278 is approximately 39 dB L_{dn}. This level of noise would not cause a significant change in ambient noise levels at that location in terms of L_{dn}, since the existing traffic noise would be nearly 20 dB higher than the mining and processing noise level.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.16.3.6-4:** The Off-Site Transfer of Ore Concentrate for Processing Alternative would cause increases in noise levels that could impact local residences through construction activities or poorly maintained construction equipment. The maximum noise levels received at the nearest ranch house, which is approximately two miles away from the nearest areas where grading would occur, would be reduced by approximately 23 dB as compared to the values shown on Table 3.16-6, ignoring sound absorption or any shielding provided by topography; therefore, maximum construction noise levels at the nearest ranch house would be in the range of approximately 47 to 67 dB. In practice, considering the topography of the Project Area, much of the construction equipment would be shielded from view of the nearest ranch house by topography. In those cases, the construction noise levels would be further reduced by five to 10 dB or greater.

  Significance of the Impact: Noise levels produced by construction activities or poorly maintained construction equipment in the vicinity of the Roberts Creek Ranch house

could be significant if such activities occurred at nighttime or if the noise level exceeds 55 dB.

- **Mitigation Measure 3.16.3.6-4:** Construction in the vicinity of the Roberts Creek Ranch house or greater sage-grouse leks would be limited to daylight hours and **would be limited during lekking periods (see Appendix D, Attachment 3)**. Construction equipment used in the vicinity of residences would be fitted with the best available technology manufacturers' noise control equipment, including engine exhaust silencers and acoustical enclosures. Noise control equipment would be maintained in good working order. **Implementation of this mitigation measure would result in a less than significant impact.**

- **Effectiveness of Mitigation and Residual Effects:** The implementation of this mitigation measure would be effective at reducing the potential impact to less than significant by controlling the generation of the noise.

- **Impact 3.16.3.6-5:** Noise caused by blasting during construction and mining could cause annoyance if residents were startled by unexpected blasts, or if blasting overpressures caused rattling of residence windows. The Off-Site Transfer of Ore Concentrate for Processing Alternative would not otherwise impact auditory resources associated with blasting.

  Significance of the Impact: This impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.16.3.6-6: The Proposed Action could generate flyrock. However, Project design would limit the potential for flyrock to travel beyond the Project fence.**

  Significance of the Impact: This impact would not be considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.16.3.6.2 Residual Adverse Impacts

There are no residual adverse impacts from noise as a result of the Off-Site Transfer of Ore Concentrate for Processing Alternative.

3.16.3.7 Slower, Longer Project Alternative

Impacts to auditory resources as a result of the Slower, Longer Project Alternative are expected to be similar to those described for the Proposed Action because of the same noise-making activities and the similar noise generation by those activities.

3.16.3.7.1 Noise Impacts

- **Impact 3.16.3.7-1:** Ambient noise levels associated with the Slower, Longer Project Alternative could be increased and affect ambient noise levels at the nearest ranch houses.

  Significance of the Impact: The predicted changes in hourly ambient noise levels at the nearest ranch houses are 1 dB or less and would be considered less than significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.16.3.7-2:** Project-related noise levels associated with the Slower, Longer Project Alternative could be increased to noise levels in excess of 55 dBA measured at a sensitive receptor site.

  Significance of the Impact: The impact would be considered less than significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.16.3.7-3:** The Slower, Longer Project Alternative would cause increases in traffic noise levels.

  Significance of the Impact: The predicted changes in traffic noise levels are less than 3 dB where the existing traffic noise level exceeds 60 dB L_{dn}; therefore, the predicted changes in traffic noise levels due to the Slower, Longer Project Alternative would be less than significant. The predicted Project-related mining and processing noise level in the vicinity of the Project access road and SR 278 is approximately 39 dB L_{dn}. This level of noise would not cause a significant change in ambient noise levels at that location in terms of L_{dn}, since the existing traffic noise would be nearly 20 dB higher than the mining and processing noise level.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.16.3.7-4:** The Slower, Longer Project Alternative would cause increases in noise levels that could impact local residences through construction activities or poorly maintained construction equipment. The maximum noise levels received at the nearest ranch house, which is approximately two miles away from the nearest areas where grading would occur, would be reduced by approximately 23 dB as compared to the values shown on Table 3.16-6, ignoring sound absorption or any shielding provided by topography; therefore, maximum construction noise levels at the nearest ranch house would be in the range of approximately 47 to 67 dB. In practice, considering the topography of the Project Area, much of the construction equipment would be shielded from view of the nearest ranch house by topography. In those cases, the construction noise levels would be further reduced by 5 to 10 dB or greater.

Significance of the Impact: Noise levels produced by construction activities or poorly maintained construction equipment in the vicinity of the Roberts Creek Ranch house could be significant if such activities occurred at nighttime or if the noise level exceeds 55 dB.

- **Mitigation Measure 3.16.3.7-4:** Construction in the vicinity of the Roberts Creek Ranch house or greater sage-grouse leks would be limited to daylight hours **and would be limited during lekking periods (see Appendix D, Attachment 3)**. Construction equipment used in the vicinity of residences would be fitted with the best available technology manufacturers' noise control equipment, including engine exhaust silencers and acoustical enclosures. Noise control equipment would be maintained in good working order. Implementation of this mitigation measure would result in a less than significant impact.

- **Effectiveness of Mitigation and Residual Effects:** The implementation of this mitigation measure would be effective at reducing the potential impact to less than significant by controlling the generation of the noise.

- **Impact 3.16.3.7-5:** Noise caused by blasting during construction and mining could cause annoyance if residents were startled by unexpected blasts, or if blasting overpressures caused rattling of residence windows. The Slower, Longer Project Alternative would not otherwise impact auditory resources associated with blasting.

  Significance of the Impact: This impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.16.3.7-6: The Proposed Action could generate flyrock. However, Project design would limit the potential for flyrock to travel beyond the Project fence.**

  Significance of the Impact: This impact would not be considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.16.3.7.2 Residual Adverse Impacts

There are no residual adverse impacts associated with the Slower, Longer Project Alternative.

3.17 Socioeconomic Values

3.17.1 Regulatory Framework

The NEPA requires consideration of local plans and policies in the assessment of the social and economic effects of proposed activities involving federal lands (43 CFR 1506.2). Federal, state, and local plans and guidelines that apply to social and economic values within the Socioeconomic Values and Environmental Justice Study Area (Study Area), include the following: Eureka County 2010 Master Plan, including the updated Natural Resources, Federal